Sir Robert Peel Bart.

THE

PRINCIPLES AND PRACTICE

OF

SURGERY,

FOUNDED ON THE MOST EXTENSIVE HOSPITAL AND PRIVATE PRACTICE,
DURING A PERIOD OF NEARLY FIFTY YEARS;

WITH

Numerous Plates,

ILLUSTRATIVE BOTH OF HEALTHY AND DISEASED STRUCTURE.

BY

SIR ASTLEY COOPER, BART., F.R.S.

SERGEANT SURGEON TO THE KING,

FORMERLY LECTURER ON ANATOMY AND SURGERY AT GUY'S AND ST. THOMAS'S HOSPITALS;
NOW CONSULTING SURGEON TO GUY'S.

Edited by

ALEXANDER LEE, M.A. M.D.

Editor and Translator of Celsus de Medicina, &c.

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TO

SIR ASTLEY COOPER, BART. F.R.S.

SERGEANT-SURGEON TO THE KING,

&c. &c. &c.

This Edition of his Surgical Works

IS MOST RESPECTFULLY INSCRIBED,

AS A JUST TRIBUTE OF THE MOST PROFOUND REGARD,

IN TESTIMONY OF MANY KINDNESSES RECEIVED

As a Pupil;

AND, THAT HE MAY LONG PRESIDE OVER A PROFESSION HE HAS SO MUCH ADVANCED, IS THE SINCERE WISH OF

HIS VERY HUMBLE

AND EVER GRATEFUL SERVANT,

ALEXANDER LEE.

PREFACE.

When we consider the unparalleled opportunities which Sir Astley Cooper has had for collecting valuable practical observations during a period of nearly half a century of unrivalled excellence, it is rather surprising that the result of his labours has been rendered only partially accessible to the Medical world at large. It is true that several Editions of his Lectures have been published in various forms; it is also true that Sir Astley himself has favoured the world with the result of his experience, by that great work on Inguinal and Congenital Hernia,—his work on Dislocations and Fractures,—his Treatise on Diseases of the Female Breast, and that splendid work of his, on the Anatomy and Diseases of the Testis, so justly admired by our Continental neighbours. But those rare Treatises are necessarily inaccessible to at least three-fourths of the profession. Under these circumstances, the Editor has been induced to undertake the republication of these Lectures, so deservedly sustaining the celebrity of their Author; and it

is to be hoped that this Edition of SIR ASTLEY COOPER's PRINCIPLES AND PRACTICE OF SURGERY will be more in character than any former one with those great works which he himself has published, as well as a just tribute of respect to the Author. This Edition will consist of the following improvements :—

1. The Editor has availed himself of what he conceived to be the most correct text of the Lectures first published in the Lancet, comparing them with Mr. TYRRELL's Edition as far as it extends, together with his own MS. Notes, and those kindly furnished him by his friends.

2. The diseases of the Testis are illustrated by highly finished Drawings, both of the morbid and healthy structure, preceded by the descriptive Anatomy of those organs from SIR ASTLEY's work on the Testis.

3. The descriptive Anatomy of Hernia, with coloured drawings.

4. The Diseases of the Breast, with their morbid appearances.

5. Dislocations and Fractures will be fully illustrated in a similar manner.

The Editor being deeply impressed with the kind condescension and well known liberality of SIR ASTLEY COOPER, in his unwearied ardour and encouragement for the advancement of Surgical Science, most respectfully begs leave to return him his most grateful acknowledgements and sincere thanks for the use he has made of those splendid

works already mentioned. To Dr. Barker, the Curator of the Museum at St. Thomas's Hospital, he is also indebted for his politeness, and the prompt facilities which he has afforded in obtaining drawings of some preparations there: and, to B. Barton, Esq. for the beauty and great fidelity of his drawings. There is another friend to whose great professional talents and literary acquirements he would fain pay the tribute of respect, were it not for his extreme modesty. In conclusion; the editor begs leave to apologize for any errors, whether of omission or commission: he is at least conscious of having used his best endeavours to render the work worthy of the public confidence, and of the universal fame of its Author.

ALEXANDER LEE,
Three Crown Square,
Southwark.

December 5th, 1835.

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LECTURES ON SURGERY.

INTRODUCTORY LECTURE.

GENTLEMEN,—While it is the province of the physician to attend to internal diseases, it is the duty of the surgeon to attend to those that are external; to perform operations for the removal of diseased parts; and to know how to regulate the system by the use of medicine, when local diseases are produced by constitutional derangement.* Surgery is usually divided into the principles and practice. The first are learned from observations on the living when diseased, by dissection of the dead, and by experiments on living animals. Our deductions from these sources furnish us with the means of knowing a malady by its symptoms, the alteration of structure in a part when diseased, and the various ways in which Nature attempts the reparative process, both in external and internal parts. A man who has seen much of morbid preparations possesses great advantages; but his anatomical knowledge cannot be perfect unless he has frequently seen and assisted in the dissection of the human body. In surgical science, hypothesis should be entirely discarded, and sound theory, derived from actual observation and experience, alone encouraged. The first is an *ignus fatuus*, which is sure to mislead; the last a polar star, a never-failing guide. Experiments on living animals have been found of the greatest utility in directing us to a knowledge of the means by which Nature acts in the reparation of injuries, and in the restoration of lost parts. Thus the method she would adopt in uniting a fracture in the bone of a dog, will show you the manner in which union of a fractured bone

Definition.

Hypothesis.

* Ego eundem quidem hominem posse omnia ista præstare concipio: Sed ubi illi se diviserunt, eum laudo qui quam plurimum percipit. CELSUS, Lib. vii. 1.

would be effected in man; the secretion of ossific matter by the blood-vessels being in each case precisely the same.

Qualifications of a Surgeon.

In the *practice* of surgery, also, many essential qualities are requisite on the part of the surgeon. The first of which is neatness in the application of his remedies; awkwardness in this respect will frequently injure his professional prospects—the patient and his friends often judge of a man's skill by his manner of bleeding, or from the application of a bandage; and it sometimes happens that "the hand spoils the head."*

Gentleness of manner.

The next requisite is, gentleness of manner; patients having a natural dislike to operations, feel still more uneasy if they discover any thing in their practitioner's behaviour which makes them apprehend rough treatment.

Violence in all cases is bad, and is sometimes followed by fatal consequences.

I was invited by a surgeon, some years since, to see a patient who had a compound dislocation of the ankle joint: there existed a considerable degree of pain and inflammation; the surgeon at once suddenly introduced a probe, raised some of the parts by it, and, his Latin being as bad as his surgery, said with the utmost coolness, *Dedenda est Carthago*, "Carthage must fall!" thereby implying that amputation must be performed; indeed, from the rough manner in which he treated his patient, there seemed no other chance for the poor fellow's recovery. In this case, gentleness might have prevented the necessity for amputation.

Self-possession.

But the quality which is considered of the highest order in surgical operations, is self-possession; the head must always direct the hand, otherwise the operator is unfit to discover an effectual remedy for the unforeseen accidents which may occur in his prac-

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* Autem CHIRURGUS esse debet adolescens, aut certè adolescentiæ propior; manu strenuâ, stabili, nec unquam intremiscente; eaque non minus sinistra, quam dextra promptus; acie oculorum acri, claraque, animo intrepidus, misericors sic, ut sanari velit eum quem accepit, non ut clamore ejus motus, vel magis, quam res desiderat, properet, vel minus quam necesse est secet; sed perinde faciat omnia, ac si nullus ex vagitibus alterius affectus oriatur. CEL. Lib. vii. Pref.

tice. Without this quality, a man may do well enough in ordinary cases, but can do little on sudden emergencies; it inspires confidence, and almost insures the success of the operation. These qualities forward the interests of professional men, whilst they diminish the sufferings of human nature. Patients generally form an opinion of a surgeon's ability by his manner: if he be of a dry, morose turn, he is apt to alarm not only the patient, but his whole family; whereas, he who speaks kindly to them, and asks for particular information, is supposed to have more knowledge, and receives more respect.

Knowledge of Anatomy indispensable.

In *all* cases, it is the duty of the surgeon never to advise an operation unless there is a probability that it will be attended with success: he should here, as in every instance, "do to others as he would have others do unto him." Let it be always remembered, that operations cannot be *safely* undertaken by any man, unless he possess a thorough knowledge of anatomy. This is the real groundwork of all surgical science; and it has ever been found that half-anatomists are bungling practitioners; ignorance here, as it always will, gives confidence without power. But it is consolatory to know, that the human frame is better understood at the present epoch by *students*, than it was forty years ago by *professors*. With us, the march of improvement has been most rapid; and it has principally arisen from the assiduity with which the modern surgeons have pursued their avocations in the dissecting-room. A few years since, all operations were attended with hazard; those now undertaken commonly do well, which can only be explained by our increased information. An old surgeon, now deceased, said, "that operations for extracting stones from the bladder, put him in mind of sailing between Scylla and Charybdis." It was replied, "that not to attempt them was certainly resigning his patients to Scylla." It is true, these operations require the most perfect anatomical skill; as do those for hernia, aneurism, and fractures of the bones of the head, attended with depression. Anatomy likewise teaches us how to discriminate disease; in which, lies more than half the cure. Without this knowledge, dislocations frequently cannot be detected;

Case of Malpractice.

whereby patients may become miserable for life, and thus the reputation of the surgeon be for ever lost. Some years since, one of the profession, whom I had long known, but had not seen for many years, called on me; I naturally inquired respecting his success. He replied, that his life had been like April, sometimes sunshine, sometimes rain. I rejoined, "How so? you have brought up a family genteelly, and have, I understand, a respectable practice." "True," said he, "but a circumstance occurred some time ago which has given me much uneasiness; I was called to attend a case of dislocation of the shoulder joint, but it so happened that I could not discover it; after attending the patient for a considerable time, another surgeon was requested to see him, who at once pronounced the bone to be out, which in reality was the case, for in a very short time he reduced it. When the man recovered, he brought an action against me; I had to pay two hundred pounds damages, and the law expenses were two hundred pounds more. The loss of the money I did not feel, but I have severely felt being pointed at as an ignorant man."

Abraham and the Dresser.

A few years ago, one of the dressers in St. Thomas's hospital, wished to perform an operation; and he turned his attention to the surgery boy, who had a bad leg, and said to him, one day, "Abraham, I should like to cut off your leg." "Indeed!" said Abraham, "I should not like it." "Oh," said the dresser, "it will never be of any use to you in its present state, and therefore you had better be without it. I will take a lodging for you; I will give you some money, and you shall be well attended." The boy's scruples were overcome; he took the money, and went to the lodging; all was fixed, and the operator began; but finding a great discharge of blood, he cried out to his assistant, "Screw the tourniquet tighter." He obeyed, but in doing so the screw broke: at this unforeseen accident, the dresser lost all presence of mind; he jumped about the room, then ran to the sufferer, and endeavoured to stop the effusion of blood by compressing the wound with his hand, but in vain; his sleeve became filled with blood, and poor Abraham would have died in a very short time, had not a pupil accidentally called, who had

An operation.

the presence of mind to apply the key of the door to the femoral artery, by compressing which he stopped the bleeding, and thus gained time for the application of another tourniquet.

Puncturing the artery, in venesection.

Some years ago, one of the dressers of Guy's Hospital, in bleeding a man, punctured the artery that lay under the vein (a situation in which he ought not to have bled), and before the blood could be stopped, the person lost thirty-seven ounces. One of the surgeons cut down upon the artery at the elbow and secured it. In doing this, he divided the principal veins; inflammation and mortification came on, and death soon followed.

Recapitulation.

I bring forward these examples to impress upon your minds that an imperative necessity exists for making yourselves well acquainted with anatomical science; without which you cannot conscientiously discharge your duty to society; and it is upon this that you must lay the foundation for your future advancement.

Necessity for Anatomical Science.

The parts of the body most essential to be particularly studied are, the brain, bones, arteries, veins, nerves, and joints. To each of these you must pay particular attention, and make yourselves well acquainted with its form, situation, and functions; otherwise you will only be exposed to ridicule, and perhaps worse, if, in your practice, you should be ignorant of the nature of these structures. You should know the nature of the human machine well, or how can you pretend to mend it? If you have a watch injured, you will not give it to a tinker to repair; you will get the best watchmaker you can to set it right. How, then, can it be supposed, that the finest and most perfect organization we know of, when out of order, should be consigned to the hands of unlearned persons? Mistakes of this kind do, it is true, sometimes happen, but much less often now than formerly.

When you dissect, do not attack all the parts of the body at once, The best plan is, to take the portion you are examining to your room, and keep it fresh by plunging it into alcohol. Inspect it with care, and note down your observations. By these means a head will occupy your time for five or six weeks very advantageously.

Physiology.

Physiological knowledge is of the utmost importance to the profession of surgery: this gives you a knowledge of the healthy functions, and thus enables you better to understand the nature of diseased action. This was the rock on which Hunter stood, admired by the wise, and abused by the ignorant; indefatigable in his research, he omitted no opportunity of exploring false theories, and substituting true ones founded on facts established by experiments. But it is said that he was a man of great genius: I do not think so; or, if he were, he owed it to his uncommon industry and assiduity. He was the last in the laboratory or study at night, and the first there in the morning, allowing himself very little time for repose. It was in this way he collected and arranged that Museum which will endure as long as any thing of the kind, the admiration of foreigners, as well as of our own countrymen. But we are still more indebted to him for the true principles of our science, which he displayed to us with a masterly hand. In this free country the same way is open to all who choose to take it, who prefer honourable and laborious exertion to idle habits, which insure ignorance, and, finally, disgrace.

The study of medicine necessary to the surgeon.

The study of medicine is important to the surgeon: he should be able to prescribe with certainty; should well understand the great influence of local disease on the constitution, as well as the *origin* of local disease from constitutional derangement. Without such knowledge, he knows but half his duty. On the other hand, a mere physician cannot be a good judge of surgical cases; and notwithstanding my respect for the physicians of Guy's Hospital, I would not hold my situation in that establishment, unless I had the right of prescribing for my surgical patients. I had, in one of these hospitals, a man under my care for a compound fracture, and had great hopes of saving the patient, as he was doing well; but a physician, whilst going through the ward, visited him, and ordered a cathartic, which, acting rather violently, disturbed him so much, that fatal consequences ensued. That a physician should not interfere with patients of this description is therefore evident; but I do not mean to say that one profession is

to be upheld at the expense of the other: far from it, indeed they should mutually assist in the great duty of preserving human existence.

Reading will be found extremely useful, when it is select; but I would not recommend works to young students which lay down *systems* for their guidance; such a plan of reading is bad. It is better to read the detached works on particular diseases. To the pupils generally, but more particularly to those who are allowed to pass in this metropolis but one or two seasons in attending the different hospitals, I strongly recommend punctuality in their attendance at lectures, and at the dissections and hospital practice. In St. Thomas's Hospital alone, you have an opportunity of seeing above 800 in-door, and a vast number of out-door patients, whose cases are equally useful as interesting to students. I caution pupils from speaking unguardedly before the patients; it can do no good to let them know what is intended for their cure, which it very often prevents. Some time ago, a man came into Guy's Hospital, having a disease that required an operation, and by no means a dangerous one. A pupil, when conversing with him, asked him where he came from: the man replied, "From Cornwall." "O did you?" said the pupil; "Well, I can tell you, you will never see Cornwall again." The patient became alarmed, and immediately left the hospital.

Reading.

Making improper remarks to the patient.

I recommend to you, also, the practice of taking notes, but not hasty ones, as they do more harm than service, by causing one term to be mistaken for another.

Taking notes.

I am happy to bear witness to the great improvement which has taken place, of late years, in the education of those who are coming forward in the various classes of medical pupils: this I consider a most essential advantage, as it tends, more than any other circumstance, to raise the character of the profession to its proper station. To the Company of Apothecaries, society is much indebted, as to them we owe the act which makes a certain course of education indispensable to medical students. In the metropolis, surgeons, of course, are highly respected, but not equally so in the country, for

Improvement in the course of education.

there the practitioner is obliged to inspect the preparation of his medicines, and, necessarily, must be often in his shop. But general education, so essential to our profession in particular, is making rapid and desirable advances, whilst ignorance flies fast before it.

Attention and perseverance to study.

I particularly request the young pupils, whose friends have at great expense prepared them for an honourable and lucrative profession, not to lose their precious time in idle and vain amusements; and while they have those opportunities which our hospitals afford, to keep their attention steadily fixed on the various branches of science which are essential to a knowledge of surgery, and not suffer themselves to be led away from the true path to eminence by the idle and unthinking; for, I ask them, how they can, on their return home, look their friends in the face, if they have neglected their duties? But, on the other hand, should they conduct themselves with good sense, and apply with diligence to their studies, they will receive their just reward.

Motives to study.

I have probably known ten thousand members of the faculty in the course of my professional life, to whose partiality I attribute my successful progress, more than to any merit of my own; and I should be wanting in gratitude, if I did not acknowledge it. I have observed that well-directed assiduity will surmount all difficulties: you should not be deterred in your efforts, even by poverty, for it is a great stimulus to exertion, and to regularity of life; all, however, will not be equally studious, for some will be fluttering in the boxes of another theatre, or come here only to interrupt their more steady fellow-students; but I will not suffer it as long as I have the honour of lecturing in this establishment: no man shall interrupt another with impunity. Perhaps some who are fashionably dressed may think proper to look down with a feeling of contempt upon the students whose attire is plain and more modest; but should such a feeling exist, I would advise such persons to pause a while, and consider what it is that makes one man superior to another in this profession. When they commence their career of public life, the plain, industrious, intelligent young man goes slowly but steadily in the right track of his profession, and rises to respect-

The contrast.

ability, perhaps even to a high rank; on the other hand, the fashionable lounger, who neglects to improve himself, finds his want of knowledge and his bad habits equally retard him: instead of rising, he sinks lower; his friends disappear, and at last he falls into obscurity, reduced to a pitiable state, blaming and abusing his more fortunate rivals. In conclusion, let me say, that if any of you wish to ask my advice or assistance in any way, I shall be most happy if you will call on me whenever you think proper. I do not say this from ostentation, but I always wish to show the junior members of the profession, that I do not forget the friendship I have experienced from their fathers.

LECTURE I.

IRRITATION.

Importance of the subject.

THIS being one of the most important topics in surgery, requires to be attentively studied, and its effects carefully watched, before any one can practise in his profession with credit to himself or advantage to others.

Doctrine of irritation.

The doctrine of irritation teaches the immediate and remote effects of injuries; in what manner nature restores them on the one hand; and, on the other, the mode in which apparently trifling accidents prove ultimately destructive.

Irritation is either local or general, and its effects are communicated from one part to another, through the medium of the nervous system, so that the heart, brain, and stomach, almost immediately after an injury has been sustained, even in the remotest parts of the body, will have their functions more or less disturbed in proportion to the extent of the injury and importance of the part injured.

Natural stimuli support the actions of the body.

All the actions of the body are excited and sustained by internal and external impressions, which are called stimulants: the blood, for instance, being the stimulus to the blood-vessels; the bile, to the

intestines; and caloric, in a certain degree, a stimulus to the whole system. Between all the different parts of the human frame, there exist intimate relations, which correspond with each other, and carry on a reciprocal intercourse of action. The beautiful harmony produced by these concurrent phenomena is called sympathy. Thus impressions not only produce effects on the part to which they are directly applied; but, in consequence of the freedom of communication between the nervous system, parts of the body situated at a distance from those in which the original mischief exists become affected by it: the real nature of sympathy is yet unknown, but we are acquainted with many of its effects. Thus numerous examples of sympathetic actions may be adduced; the communication which exists between the uterus and breasts is a striking instance of it. Sneezing is a sympathetic action between the nose, velum palati, and the abdominal muscles; coughing, also breathing, and the expulsion of the fæces, are a few among the numerous examples which might be enumerated.

Sympathy.

Natural sympathy.

Diseased sympathy.

But sympathetic action is also the result of injury and disease, becoming the cause of restoration on the one hand, or of destruction on the other; and this state of the body I call irritation. Irritation, gentlemen, may be defined to be an altered action, excited in the system by an unnatural impression. Thus sympathetic pain is experienced in the knee and foot from diseased hip, and at the extremity of the penis, when there is stone in the bladder. The passage of an urinary calculus through the ureter occasions retraction of the testicles and pain in the thigh; disease of the prostate, causes pain on the inside of one or both thighs; disease of the liver occasions pain in the shoulder; diseased testicle, pain in the loins; irritation of the intestines, an itching of the nose.

Definition.

Irritation produces diseased actions.

These sympathetic effects, which we have just been describing, do not consist of morbid actions in the parts thus affected, but of disordered sensations. But morbid actions are also, sometimes, excited in parts near to, or at a distance from, those originally affected. Inflammation of the testicle is frequently the consequence of irritation in the urethra; and swellings of the breast, of a morbid action

of the uterus: but there is no organ so much affected by irritation, or sympathetic influence, as the stomach. For instance, if a blow is received on the head, causing injury to the brain, vomiting is one of the first and most constant symptoms, being imparted to the stomach through the eighth pair of nerves, and by this we are led to detect the injury. Vomiting is produced when the testicles are injured, or intestines burst, wounded, or strangulated, and from a gall-stone passing the biliary duct; indeed, an obtuse pain in any part of the body will occasion sickness.

The consequences of irritation are so numerous and important, gentlemen, that I shall relate to you the medium of its communication. Irritation is generally communicated through the medium of the nerves, of which there are two grand divisions in the body. The first composed of the brain, spinal marrow and their nerves, which naturally convey sensation and volition; the second consisting of the grand sympathetic nerve, the centre of which is behind the stomach, in the semilunar ganglion and solar plexus. The modes of sympathetic communication are various. In some instances, the course of irritation is from the irritated part to the sentient extremity of the nerve, as the pain experienced in the knee and foot from a disease of the hip. In other cases, the course of sympathy is from the affected part to the origin of the nerve, as in pain in the loins consequent on diseased testicles. Irritation on the nerves of the grand sympathetic is communicated to the stomach, probably through the medium of the semilunar ganglion, and all injuries to the stomach are attended with serious effects. I could relate to you several instances in which injury to this organ had proved fatal. A man walking through Fleet-street, one day, happened to quarrel with a woman, when another came up, and gave him a blow in the region of the stomach, which caused almost instantaneous death. On dissection, no cause could be found to account for his sudden death. A man belonging to the India House, was attempting to lift a weight, when another came up, and jocosely said, "Here, stand on one side, and let an abler man attempt it;" and at the same instant gave him a slight blow on the stomach, when

The course of irritation.

the poor fellow dropped down and expired. His body, upon being opened, showed no marks of violence.

Local or general.

Irritation is either local or constitutional.

Local.

Sometimes it is local, affecting only particular parts; at others, attacking the whole system. A decayed tooth will produce an abscess, and the matter will escape by forming an opening through the cheek. This ulcer will be very difficult to heal if the tooth remain; but extract it, and the disease will quickly disappear, the cause of irritation being removed. Many cases of this kind have fallen under my observation, and I will relate a few by way of illustration.

Case.

Two persons came to me from the same place, without knowing each other's situation or intention; each of them had an abscess near the alveolar processes; which, on examination, I found extensive, producing an external opening. The disease had been of long standing, in both cases; I directed a diseased tooth near the ulcer, to be drawn, and the patients quickly recovered.

Case.

A lady in Essex, had for a long period been afflicted with a fungoid granulation, which protruded through an ulcerous opening in the cheek, and which had resisted the use of every means. Upon stating one day that a tooth near the part, was occasionally painful, she was recommended to get it drawn; the tooth was extracted, and the fungus quickly disappeared.

Case.

A gentleman of my acquaintance had, for many years, been exceedingly annoyed by an ulcer on the chin; every attempt to heal it having proved ineffectual, it was considered incurable. At length, one of the teeth opposite the wound becoming painful, it was extracted, when, to the delight and astonishment of the patient, his malady disappeared.

Case.

Mr. Toulmin, of Hackney, attended a lady, on account of her suffering severely from a diseased tooth; and she appeared also to be affected with hemiplegia. Mr. Toulmin extracted the tooth by the lady's desire, and in a short time the paralytic affection entirely subsided.

These cases are mentioned, to show the importance of endeavour-

ing to ascertain the *causes* of diseased sympathetic actions, as the removal of those defects will depend on the cure of their causes. If the causes be undiscovered, the effects are likely to continue in spite of every means that you may employ.

Constitutional symptoms.

The constitutional or general effects of irritation are frequently produced by the most trivial local cause. A person, on having a bougie passed into the urethra for the first time, feels faint, becomes sick, looks pale, and, unless you prevent it, will fall on the ground. On placing him in the recumbent posture, with his head a little lower than his body, and as soon as the blood freely enters the brain, all his functions are restored; but constitutional irritation frequently comes on in the evening, which, however, soon ceases. From the irritation of the urethra you see, gentlemen, that the stomach is influenced, the actions of the heart are suspended, and the powers of the mind gone. The symptoms of constitutional irritation following injuries are best exemplified in compound fractures. In these cases, the irritation runs very high, and the heart, brain, and stomach are much affected. A person receives an injury to the leg, producing compound fracture of one or both bones; constitutional irritation commences generally in twenty-four hours; the patient complains of pain in his loins, extending up the spinal cord, and pain in the head. He then becomes restless, and his countenance anxious; the tongue at first is dry, and covered with a whitish fur; but, as the symptoms increase, it becomes yellow, and lastly coated with a thick brown fur. There is loss of appetite, the stomach becomes irritable, and nausea and vomiting supervene. The secretions are diminished, and the stools are white. As the severity of the complaint increases, the pulse becomes quick, hard, irregular, and alternately intermittent. The respiration is hurried, intellect deranged; all impressions on the senses are painful; subsultus tendinum, hiccough, vomiting, and tension of the abdomen come on; the patient sinks into a low muttering delirium, and soon expires. Thus, in constitutional irritation, whether from injury or disease, every part of the system is affected by it; and this effect appears to be produced in the follow-

Rationale.

ing manner. When any part of the body receives an injury, the nerves convey to all the important organs of the body, spinal marrow, heart, stomach, &c., an impression of that injury. Nature immediately commences the restorative process, by stopping all the customary secretions; the various outlets being thus closed, the blood collects in large quantities in the heart and great blood-vessels, which propel the blood with increased force to the wounded part; this gives rise to some form of inflammation, the one best suited to accomplish the desired effect. Here is an illustration of the manner in which nature contends for cure; during the battle, she occasionally requires to have her ardour checked, or calls for support in proportion to her want of power; we must watch her proceedings with an eagle eye, and be exceedingly cautious in all our proceedings; for if we should open the various sluices of the body, and restore the secretions too soon, we may, by abstracting blood from the injured part, prevent the restorative process; or by increasing the excitement, disturb nature's operations.

Idiosyncrasies.

The degree of constitutional irritation, resulting from injury, depends on, several causes, First, on the importance of the part injured. Secondly, the extent and nature of the injury. Thirdly, the state of the constitution, age, and previous habits of the patient. Thus we see that constitutional irritation is very different in some persons to what it is in others; so that a wound, which in one man would be attended by the most dangerous consequences, might not, in another, disturb the functions of any important organ; this greatly depends on the state of the system at the time of the injury; his mode of living, and the climate in which he resides; excessive irritation frequently follows an operation on very young subjects, but rarely those performed on very old persons. In infancy, the irritability is excessive, and the system is easily excited to destruction: after the period of two years the irritability is considerable, but the powers of restoration are great; in old age, irritability is much diminished, but the powers of restoration are much less; thus, many gentlemen present would probably in autumn overcome a disease, that in the spring would overcome them; that is, if they have

Infancy and old age.

Season.

been paying proper attention to their professional studies, by devoting their time to anatomical pursuits.

The following cases are important, and place in a strong light the dreadful constitutional effects which occasionally result from very slight local causes.

A man who had lived intemperately, was bled by the late Mr. Saunders on a Tuesday; on Thursday (having indulged in the interim in the pleasures of the table) the wound in the arm was inflamed; on the Saturday the inflammation had considerably increased; on the Sunday gangrene commenced; and on the Monday, I was asked to see him. I found him with the delirium, hiccough, and subsultus tendinum; and on the following day he died. On dissection, the skin, to a great extent round the wound, was found mortified; the cellular membrane had suppurated to a large extent, but the vein which had been opened was not inflamed. Case.

Dr. Ludlow, of Calne, whilst shooting, pricked his hand with a thorn in getting over a hedge; the part soon became inflamed, and though he procured the best surgical assistance, yet he died of tetanus within a week after the accident. Case.

Another remarkable case was that of a brewer's servant, who, in removing some casks on a Saturday, had a small splinter of wood forced under the thumb nail; at the moment he did not regard it, but in the same night he awoke in dreadful pain, and requested his wife to get up and make a poultice; this he applied, but it did not afford him any relief. On Sunday he became worse; Tuesday the pain had extended up the arm, and his hand was considerably swollen. On Thursday I was requested to see him, and on examination, found that matter was formed in the hand; I made an opening with a lancet near the part where the splinter had entered, when a large quantity of pus was discharged. The man appeared greatly relieved, and I thought he would do well; but upon hearing a noise as I was about to quit the room, I looked round: he had, by a convulsive effort, raised himself in bed, but immediately fell back and expired. Case.

An instance of a totally different nature from those just men- Case.

tioned, which shows that a great degree of injury may be incurred, and the person yet do well, occurred in another brewer's man who was run over by a dray. There was compound fracture of the elbow joint, extensive laceration of the integuments, and a large wound communicating with the joint. The man was admitted into Guy's Hospital; an operation was proposed, but the patient would not consent. The wound was therefore dressed, and in a short time it completely healed, without any unfavourable symptom shewing itself.

Irritation modified by age and temperament.

Irritation is greatest in children, and least in aged persons; the former are very much affected by operations, whilst the latter are very slightly so. Children under two years of age, upon having stones removed from their bladders, will be frequently carried off by convulsions; therefore, if you can possibly avoid it, never perform the operation on a very young child, at all events not under two years of age.

Thus, an injury which in one person would be attended with the most dangerous effects, will in another produce little constitutional derangement; and the same person may at one period suffer but little from a wound, which at another may give rise to fatal consequences. It is on this account that punctured wounds inflicted in the dissecting room, often produce such distressing effects; though it may, in some instances, arise from the absorption of morbid matter, which usually produces the most aggravated form of constitutional irritation; it is therefore impossible that you can be too careful of the instruments you use in dissecting and opening bodies, as carelessness on this point has caused the loss of many a valuable life.

Wounds in the dissecting room.

LECTURE II.

TREATMENT OF IRRITATION.

The treatment of irritation being much the same as that required in inflammation, I shall now give but a short description of it.

When constitutional irritation arises from a local cause, the remedies must be chiefly directed to the removal of that cause, or to lessen its effects on the constitution; but, on the contrary, when local disease is either promoted or aggravated by constitutional derangement, then your remedy must be directed to the disorder of the system; and as that improves, so will the local affections disappear.

Case

A short time since, a case of compound fracture was brought into Guy's Hospital. For the first five days there was no alteration; after a time, however, the man's constitution suffered very considerably; a probe was passed into the wound, and a loose portion of bone was found pressing against the tibialis anticus; the part was dilated by a scalpel; the detached bone extracted; the constitution began to recover its former vigour, the patient's health very rapidly improved, and he is now discharged cured.

Case

A case of simple fracture of the superior portion of the tibia was admitted into St. Thomas's Hospital, which was followed by violent irritation of the whole system. The whole limb became inflamed, and matter formed at the seat of the fracture. After a short time it was thought proper to amputate the limb, when on examining it afterwards, small pieces of bone were found, which kept up the irritation. The patient soon recovered from the operation.

Constitutional.

Constitutional irritation must not be too suddenly subdued nor destroyed, as a certain degree of irritation shows that nature is endeavouring to accomplish the restorative process; keep it within bounds, carefully watch its progress, and, if necessary, check its violence, but do not entirely destroy it.

Means of allaying irritation.

There are two means of reducing irritation.

First, by restoring to the different organs their various secretions, by which the outlets become opened, and fever lessened. A man who has his skin hot and dry, and his body altogether hot, will feel well and be relieved, if you can produce on the surface a free perspiration. To produce the secretions from the intestinal canal, you must give aperients; but when the irritation is very severe indeed, you must not limit your medicine to any particular part, but endeavour to restore all the secretions. This will be best accomplished

by administering mercurials to act upon the liver, saline medicines upon the intestines and kidneys, and antimonials on the skin.

The *second* method of relieving irritation is to allay the excitement of the nervous system; this may be done by giving opium and antimony combined, or calomel, antimony, and opium, to act on the skin and liver as well as the nervous system. The dose for an adult is two grains of calomel, two of antimonial powder, and one grain of opium. To this you may add saline medicines, if you like, as they are given as much to assist the medical man as his patient! It must not be considered, however, that such medicines are entirely useless: the liquor ammoniæ acetatis with tinctura opii is a good medicine. The alkalies, judiciously given, lessen the irritability of some organs, as the bladder, when in an irritable state.

In cases of irritation, bleeding must be resorted to with care, for if it be carried to a great extent, the powers of the constitution will be unequal to the reparation of the injury.

Case. A man was brought into Guy's Hospital with concussion of the brain; the dresser who admitted him was a great admirer of venesection, and bled the patient three times a-day; in ten days he died. Upon examining the head after death, a very slight laceration of the brain was found, but no signs of any attempt at restoration. The continued abstraction of blood had robbed nature of her restorative powers. In compound fractures it is likewise extremely dangerous to bleed largely.

Where there is chronic irritation, no medicine will be found equal to the Plummer's pill, five grains night and morning; it increases the secretions of the liver, intestines, kidneys, and skin. If the blue pill be given, or calomel, it should be followed by an aperient in the morning, else its action will be confined to the liver, but not in proportion on the other secretions. To attempt to cure such diseases suddenly, or by violent and active means, must ever be improper: a chronic treatment is required, and by slow degrees only can you restore the body to a healthy state. Let me repeat, all the secretions must be restored, as this is the grand principle in the cure of disease.

The influence of the mind on some of the functions of the body is well known, and requires the greatest care on the part of the medical attendant. It is the surgeon's duty to tranquillize the patient, to beget cheerfulness, and impart confidence of recovery. Therefore it is your duty to support hope, to preserve tranquillity, and to inspire cheerfulness, even when you are still doubtful of the issue. Influence of the mind.

INFLAMMATION.

Inflammation is the means by which local injuries are repaired, and it may be therefore considered as the restorative principle. There are four signs that commonly attend it, *viz.*, redness, pain, increased heat, and swelling. Restorative principle.

First. Redness. This arises from an increase of the red particles of blood in the part, and may be distinctly seen when the inflammation is superficial, as in inflammation of the conjunctiva of the eye; and that it is the result of a dilated state of the vessels, is readily ascertained by injecting parts, in which the vessels are naturally of small dimensions; as for example, by the injecting an inflamed peritoneum, pleura, or tendon, which is a part naturally possessing but little vascularity. Redness.

Secondly. *Increased Sensibility*, which is owing to distension of the nerves by the greater quantity of blood determined to them. Parts naturally little sensible are quite the reverse when in a state of inflammation. I was called a short time since to a case where it was requisite to saw off a small piece of the tibia. During the operation I opened a cavity in which was a small piece of bone embedded in granulations; the latter were extremely sensitive: extract of belladonna was applied, which gave instant ease. Bones, though nearly destitute of sensation in their healthy state, are sometimes extremely sensitive when inflamed. Not only is the sensibility of a part increased by inflammation, but its irritability is exceedingly augmented by inflammation. If an hydrocele be injected when inflamed, it suppurates instead of adhering; and if amputation be performed through an inflamed part, the stump scarcely ever unites by the adhesive process, but passes into a Sensibility.

suppurative, and sometimes a sloughing state. Therefore, an intelligent surgeon generally avoids cutting into an inflamed part, from the great pain which it inflicts, and from the restorative process being difficult, on account of the great irritability of the inflamed surfaces.

Heat

Thirdly. *Increased Heat.* Mr. Hunter denied that this existed. He made an incision two inches deep into the gluteal muscles of an ass, and into the wound he introduced a tin canula, one and a half inch long, so that there was half an inch of wound below the canula; he then passed a plug of wood through the canula, to the bottom of the wound, and confined it there, in order to prevent an union of the muscles. This was on a Wednesday. Immediately after the wound was made, a thermometer was introduced into it, and the mercury rose to 100°, exactly as another did at the same time which had been passed into the vagina. On the next morning the plug was taken out, and the ball of the thermometer introduced to the bottom of the wound; the mercury rose to 100°; the plug was then again returned and secured as before. In the evening the experiment was repeated with the same result. On Friday morning the thermometer, when introduced, rose to 99° only; and in the evening it rose to 101°. On Saturday morning, when introduced again, the mercury reached 99°; in the evening 100°. Mr. Hunter also introduced a thermometer into the opening made during the operation for hydrocele, and it rose to 101°; after twenty-four hours it was no more than 100°. Though no increase of heat is manifested in internal inflammation, yet, when it occurs on the surface of the body, an alteration sometimes of several degrees takes place; as on the inside of the thigh, where a blister was applied, the thermometer rose to 90°, while on the inside of the opposite thigh it only reached 83°.

Swelling.

Fourthly. *Swelling.* This is owing in part to an increased determination of blood to the part, and also depends on effusion of the fibrin of the blood, which, in coagulating, deposits serum in the surrounding cellular tissue.

Terminations of Inflammation

Inflammation has four termininations.

First. *Adhesion.* This arises from the fibrin of the blood being effused into the cellular membrane, by which the parts become glued together. It had been supposed that it was albumen which was poured out in inflammation; but in examining this subject with care, it is found that the character of the effused substance, in all respects, resembles the fibrin of the blood, and by this substance are the edges of the divided parts reunited. Adhesion.

Secondly. *Suppuration*, or *secretion of pus.* This is composed of particles nearly similar to those of the blood, only differing in colour, swimming in a fluid resembling serum, and coagulating, as serum does, when exposed to the influence of heat. Suppuration.

Thirdly. *Absorption* or *ulceration.* This arises from an increased action of the absorbents, produced by pressure united with inflammation, by which the parts are partially absorbed. Ulceration.

Fourthly. *Gangrene*, which consists in the destruction of the life of an inflamed part. The arteries, enfeebled by excessive action, are deprived of their vitality, the blood coagulates in them, and gangrene is produced. Gangrene.

These are the local effects; the constitutional ones are similar to those of irritation, which I mentioned to you in the last lecture.

Inflammation produces different results in different parts. When seated in the skin, it usually becomes extensive, because the surface is unbroken. Its colour is very florid; it separates the cuticle in the form of vesications, which usually contain serum, but also in some cases fibrin; a serous effusion is also produced by it into the subjacent cellular tissue. In some instances it is preceded by fever, in others followed by it. In the cellular membrane, inflammation produces an effusion which obliterates or fills its cells; if it proceed, it occasions suppuration, and produces an abscess, the contents of which are frequently discharged by the process of ulceration. In debilitated irritable constitutions inflammation destroys the cellular tissue and produces carbuncle, which is a sloughy abscess in the cellular tissue. When chronic, it occasions tumours of various kinds, as the steatomatous or adipose; or, under peculiar circumstances, those of a malignant nature, as the scirrhous, fungous, &c. Inflammation of texture.

Inflammation of the fasciæ mistaken for Erysipelas.

Inflammation of fasciæ is generally extensive, from the large surfaces they present; they are often seen inflamed in compound fracture, producing redness of the skin to a considerable extent, and it is a very unfavourable sign in this accident. When matter is produced by inflammation of this texture, and is seated under it, great irritative fever succeeds until it is discharged; as, for example, in the palms of the hands, or soles of the feet.

Muscles.

When inflammation attacks muscles, it is known by the spasmodic twitchings which attend it. For instance, in a few hours after simple fracture, when the limb has been carefully adjusted, it becomes disturbed by involuntary convulsive catchings, occurring when the patient is going to sleep, or awaking from rest.

Tendons.

Tendons are not very susceptible of inflammation, but they sometimes become inflamed to a considerable extent. When this happens, for example, in the finger, the fore-arm swells, is red, and matter forms in the course of the tendon, which sloughs to its junction with the muscle: but in all to a greater extent than the surrounding soft parts. Punctured wounds of tendons are apt to produce tetanus more than wounds of other parts of the body. Matter formed under tendons burrows to a great extent, and produces violent irritation, as under the tendon of the occipito frontalis muscle, and the covering of the temporalis.

Absorbents.

Inflammation in the absorbent vessels is marked by red lines on the skin in the course of these vessels. These form hard knots, from the skin participating in the inflammation. Their glands become also inflamed, and both glands and vessels occasionally suppurate. They more frequently inflame from common irritation than the absorption of poisons.

Arteries.

The arteries are rarely inflamed, excepting after wounds, or the application of ligatures. Inflammation, however, of the arteries may be very extensive, when it occurs in a person whose health is very much deranged. I have known instances where it extended even to the heart. I was present when Mr. Cline opened the body of a man, who had a ligature put on the femoral artery near the groin, and who died at the second week from the operation. The internal surface of the artery was inflamed, as was also that of the

external and common iliacs, and the aorta was of a florid red internally, as far as the valves of the heart.

Veins. Veins which are inflamed from wounds, become like hard and broad cords, and extremely tender to the touch; and if it occur from bleeding, it extends from the orifice to the axilla. I have seen several patients die from this cause; and on examination, the inner coats of the arteries have been generally found adhering. I have seen suppuration of a vein, and I once saw an abscess in the longitudinal sinus of the dura mater, of which we have a beautiful specimen in the anatomical collection in St. Thomas's Hospital. When inflammation of the veins is produced by the application of ligatures on them, it will be found to be greater below the ligature than above it.

Nerves. Nerves are very rarely inflamed, but when they are, the pain is excessive, and there is a tingling sensation in the parts to which the nerve is distributed. Wounds of nerves, though extremely painful at the moment, are followed by little irritation.

Case. The wife of a medical gentleman was obliged to have the posterior tibial nerve divided, for a painful tumour on the nerve, which I did in the presence of Mr. White, surgeon to the Westminster Hospital; although the operation was dreadfully painful, and the pain extended through the brain, spinal marrow, and the nerves proceeding from it, yet it did not affect the nerves of the great sympathetic, directly or indirectly. I have also had occasion twice to remove portions of the sciatic nerve, when but little constitutional irritation followed. Severe pain takes place sometimes in the course of the nerves, but whether it be from inflammation or not, I have not been able to ascertain by dissection. When the pain is excessive, it is called tic doloureux.

Ligaments. Ligaments, like tendons, are not very prone to inflammation in healthy constitutions; but the synovial membrane which lines them is highly so, and the inflammation has a tendency to go on to the suppurative process. In scrofulous persons, the synovial surface becomes inflamed, and the ligament covering it thickened, so as to produce great enlargement of the joints.

Cartilage. Cartilage in joints ulcerates from inflammation, and often becomes entirely destroyed.

Bones. The bones, like other parts of the body, are subject to inflammation; and when fractured, it is by this process that their union is effected. Suppuration, ulceration, and mortification, or the death of the bone, also attack this structure; thus you see that, like other parts of the body, it is subject to the different processes of inflammation.

Membranes. Exhalent membranes, when inflamed, are remarkably disposed to pass into the adhesive inflammation; whilst mucous membranes, on the contrary, generally go into the suppurative state. Mr. Hunter made several experiments to confirm these facts, which have been verified by later physiologists.

Healthy inflammation. Inflammation may be of the healthy or unhealthy kind. No wound can be restored without the former; even the small puncture made in bleeding would inevitably destroy life, were it not for this salutary principle; a slight inflammatory action throws out upon the edges of the wound adhesive lymph, by which they become permanently united. When a ligature is put upon a large artery, unless inflammation supervened, no good effect would be produced. The first thing nature does in this case is, to form a clot of blood at that part of the vessel where it has been tied; inflammation supervenes, adhesive matter is thrown out, by which the internal coats of the artery become firmly glued together, and hemorrhage prevented.

Unhealthy If the constitution be in an unhealthy condition, this process will not be effected; so that when the ligature comes off, the person may die of hemorrhage. Inflammation in a healthy constitution, is the VIS MEDICATRIX NATURÆ, established for the purpose of restoration; but the inflammation, without any obvious cause, is generally of the unhealthy kind, and arises from irritability of the constitution, and an enfeebled state of the affected part.

Acute or Chronic. Inflammation is either acute or chronic. The first passes through its stages with rapidity, while the latter is exceedingly slow in its progress. The chronic is either the result of acute inflammation, or is owing to a peculiar state of the constitution; as heat, which

occurs in persons who have lived intemperately, or in those who have been exposed to excessive and laborious exertion, or who are the victims of anxiety and disappointment.

Acute Inflammation.—One of the best examples of acute inflammation is seen in the breast after delivery. The adhesive stage is marked by hardness and pain; the suppurative, by irritative fever, fluctuation and throbbing, or pulsation; ulceration usually succeeds in a short space of time, and the matter is soon discharged. Acute inflammation.

Chronic Inflammation.—A good example of acute inflammation, terminating in chronic, is observable in ophthalmia. When consulted in cases of this description, during the acute stage of inflammation, you must bleed both locally and generally. This may be done either by opening a vein in the arm, by the application of leeches to the temples and palpebræ, or by opening the temporal artery, which sometimes relieves, from its free anastomoses with the ocular arteries. You should use such applications as will soothe and allay the local irritation, and these should consist of narcotic and emollient fomentations. When by these means the acute inflammation ends, the chronic frequently begins. In the first, our object is to diminish power; in the second, it is necessary to stimulate the vessels, to contract their diameters, to lessen the quantity of blood which has accumulated in them, and thus restore them to their natural state. This is best effected by astringent and stimulating lotions, as the solutions of alum, sulphate of zinc, nitrate of silver; and as the system of depletion required during the acute stage may have produced debility, the use of tonics must not be forgotten. Chronic inflammation.

An instance of chronic inflammation succeeding the acute may be seen in gonorrhœa. During the first stages of this complaint, we are obliged to check the action of the vessels of the urethra, but afterwards to excite it by the balsam of copaiba, and slightly stimulating injections.

Inflammation is of two kinds, either common or specific. Common or specific inflammation.

The first, with its terminations, has been already described, and

is called healthy inflammation. But the second, or specific, is of a peculiar kind, and is called unhealthy. In this inflammation, the vessels have an entirely different action to what happens in the healthy state, and thus the fluids and solids they secrete, have a decidedly opposite character.

Specific.

There are two descriptions of specific inflammation: the first is produced by a peculiar condition of the constitution; and the second, by the application of a poison.

Arthritic inflammation.

Gout is an example of the first kind. If a man for a length of time yield to every injurious excess, loading his stomach with food and wine, so as to weaken the digestive powers, he probably excites in his system what is called the gouty disposition; he experiences dreadful pain in one or more of his toes, &c., and severe inflammation ensues, which frequently terminates in the secretion of a matter that speedily becomes solid, usually called chalk-stone; this name, however, is incorrect, as it has been proved by the analysis of Dr. Wollaston, to consist of uric acid and soda, consequently is now very properly named urate or lithate of soda.

Scirrhous inflammation.

The formation of scirrhus or cancer is another example of specific inflammation, arising from a peculiar state of constitution. Let us suppose that two women receive each a blow on the breast; one woman with a constitution in a healthy, vigorous state, and the other with a system predisposed to the formation of cancer; in the first individual the inflammation will be strictly healthy, going through its different stages until a cure is accomplished; in the other person, owing to a constitutional peculiarity, the same extent of injury will produce cancerous disease, a malady over which medicine has no influence, and extirpation is only an uncertain remedy. Persons afflicted with cancerous or fungous complaints, are of exceedingly anxious minds (at least nine times in ten); this anxiety occasions a sort of irritable fever, which invariably proves detrimental.

Scrofulous inflammation.

But the best example of specific inflammation is scrofula. Persons attacked by this disease have generally light hair, fair complexion, delicate appearance; when inflammation occurs, it is

slow in its progress, although easily excited; and at last, ulceration taking place, the discharge consists of curdy matter, or a thin serous fluid, not at all resembling the pus which is formed in healthy inflammations.

The second kind of specific inflammation is caused by the application of poisons. Thus, in gonorrhœa, the matter secreted is widely different from common healthy matter, having, in the first place, a much larger quantity of mucus mixed with it, and, secondly, when applied to a secreting surface, is capable of exciting in the part an action by which similar matter and the same effects can be produced. The matter of small-pox occasions the same result, and as far as constitutional effects are concerned, it does not seem material how large or how small a quantity of the poison is applied, the result in each case depending upon the state of the constitution. From poisons.

There is another kind of inflammation which I would call the *irritable:* in this disorder the nerves are much more affected than the blood-vessels. You are called probably to attend a person, who tells you that he feels in a particular part, as the hand or arm, a most agonizing pain; and if inexperienced in these matters, you will be inclined to doubt the correctness of your patient's statement, and the more so as you can discover no alteration in the appearance of the part. It may not be amiss to mention here what happened to me some time ago. I was requested to see a lady having this complaint in her foot: I tried by every possible means to remove it, but in vain. When unsuccessful, I invariably recommend the sufferer to some one else. This lady consulted two other very eminent surgeons, but their efforts, in like manner, were unable to afford relief; and finding that she got worse in town, she went into the country for change of air, where, without any medical means being employed, she entirely got rid of her troublesome companion. I saw this lady afterwards, and she described the pain that she used to feel as horrible; it was constantly at the bottom of her foot; and if she walked but a very short distance, it occasioned a confinement during four or five days. Irritable inflammation. Case.

The eyes are very subject to this torturing disorder. But no

Ophthalmic and mammary inflammation.

parts are more frequently attacked by it than the breasts of young women. It produces such a degree of tenderness that they cannot bear the slightest pressure, and their stays consequently occasion great inconvenience—the pain extends to the shoulder, down the arm, and even to the elbow, at the same time producing constitutional irritation. To cure these pains and general derangement, such medicines must be given as will influence the secretions, but more particularly those of the uterus.

Testes.

The irritable inflammation frequently attacks the testicles, and renders them exceedingly sensitive, the slightest pressure causing very great pain. There is in these cases little or no alteration of size; if any difference, the affected one is the smallest. In three instances I have been obliged to remove testicles for this disease. The subject of one of these cases was a gentleman from South Carolina: he came to England for advice, and went the whole round of medical men, without experiencing any alleviation of his sufferings. He then desired me to remove the torturing part; this was done, and the gentleman went back to his native country quite well. I heard, that soon after his return he got married, and, am happy to add, that his lady had a child!

Bladder.

The bladder is also very commonly disordered by this irritable inflammation, and the symptoms in many respects resemble those of stone—in both cases there is pain in making water, and the urine is frequently mixed with blood. The grand difference in the two cases is this: the irritable bladder is most painful when the organ is *full;* the bladder that contains a stone, when it is *empty*. Upon dissection, the inner coat of an irritable bladder has been seen the colour of red velvet. I have known this irritable inflammation attack the rectum, and produce excessive suffering, which was relieved by large doses of soda, rhubarb, and the compound powder of ipecacuanha.

Cause of inflammation.

Inflammation sometimes arises from debility, and this state is frequently seen in the lower extremities of old persons, in whom the blood returns to the heart with difficulty. From this weakened power, the arteries are called upon for unusual exertion, and inflam-

mation of the skin succeeds, frequently attended with incrustations, a serous discharge, and sometimes with a watery secretion into the cellular tissue.

Irritable persons are much more predisposed to inflammation than others, and when it occurs in them it is of a more dangerous nature than in those who are not irritable. Thus in fevers, when the constitution has been much weakened, the parts on which the body has been resting become inflamed, and quickly mortify. But in fractures, where the system is healthy and strong, although the patient remain many weeks in bed, no such effects are produced. Where there is great irritation, inflammation is always dangerous: and the application of a blister to the chest, for the removal of a cough after measles, frequently, in this town, destroys it by bringing on mortification. Mercury, in like manner, by rendering the body irritable, disposes it to inflammation; and it is wrong to operate on a patient immediately after a mercurial course, on account of this inflammatory tendency. Predisposing causes.

The exciting causes of inflammation are whatever produces an unnatural state of the part, calling upon nature for its reparation, which she effects by the process of inflammation, as bruises, warts, pressure, extraneous substances, &c. &c. The manner in which nature repairs these injuries will be more fully explained hereafter. Exciting causes.

Proximate causes of Inflammation.—With regard to these there has been, and still is, much difference of opinion. Boerhaave's opinion, of an obstruction in the smaller vessels, arising from the thickness of the blood, is false—for instead of being thicker, it is absolutely thinner. Cullen's theory, of spasm in the extreme vessels, is equally erroneous. These are the results of opinion not founded upon observation. We should observe first, and think afterwards. The true proximate causes of inflammation appear to be an increase of action in the vessels of the part, and an increase in the size of the vessels themselves. These phenomena are well demonstrated by the following experiment; *viz.*, Stretch the web of a frog's foot, and place it under a good microscope, put on it the smallest drop of nitric acid, or prick a spot with a pin: you Proximate causes. Experiment.

will soon perceive in the vicinity of the irritated part considerable agitation, and presently a red particle of blood will make its appearance in a vessel that had previously been the receptacle of transparent serum only—each pulsation pushing it on farther and farther. This red particle distends the vessel, and is succeeded by others passing freely into the vein. All the vessels of the part then take on similar actions; and thus you create under your eye, speaking figuratively, meandering rivulets of blood. The dilatation of the vessels in inflammation is not, however, confined to the part itself, but is also observable in the larger arteries leading to the scene of irritation: thus, in persons who have died, having inflammation in a foot, the femoral artery on the affected side has been found larger than the opposite. I before explained the manner in which nature throws a quantity of blood to a part for the purpose of repairing an injury, or for the removal of irritation; I will give another illustration of this, which, if you have not seen, most probably all of you have felt. It is this: when any offending matter gets under the eyelids it produces irritation;—nature immediately sends a quantity of blood to the lachrymal gland—this blood occasions a secretion of tears, and these are directed in streams over the eye, for the purpose of washing off the offending substance.

Illustration.

[Sir Astley then stated, that he would show a beautiful specimen of fungus hæmatodes. The tumour was of very large size, and, when cut open, exhibited the usual characteristics of this malignant disease; *viz.*, cysts filled by a transparent fluid; extravasated blood in clots; some of its parts were whitish, while others were very dark, and the whole was of a spongy, elastic texture.]

LECTURE III.

TREATMENT OF INFLAMMATION.

Constitutional or Local.

THIS is either constitutional, local, or both combined. When any important organ is injured or its functions disturbed, in consequence

of the influence of the injury on the constitution, the treatment must be invariably constitutional, let the local be whatever it may; for no vital organ can be disturbed in its functions without producing general derangement, which will be, more or less, in proportion to the importance of the part wounded, and the extent of the wound. Inflammation, however, in many persons, requires constitutional treatment, whether any important part be injured or not; as, in irritable habits, where very trivial local damage will speedily affect the entire system.

Bleeding.

The most powerful means of relieving inflammation is by the abstraction of blood. Its beneficial effects principally result from producing a diminution of nervous power; and that it does accomplish this, is proved by the syncope which it occasions. Thus, often the removal of a very small quantity of blood even causes a suspension of the mental faculties, as well as of all the voluntary functions. Fainting, however, cannot be suddenly produced unless the patient be in the erect position at the time the blood is drawn; for it is the loss of this fluid by the vessels of the brain, which is the immediate cause of fainting. To prove this, when you next bleed a man until he faints, place him in the recumbent posture, and let his head be situated a little lower than his body, to facilitate the return of blood to the brain: in a very short time after being thus placed he will open his eyes, and all his faculties will resume their former abode.

Modus operandi.

The second mode by which bleeding relieves, is by lessening the quantity of blood; for when there is much fulness of the vessels, the momentum will necessarily be great, and consequently the vital fluid will be thrown with greater power, not only to the inflamed, but to every other part of the body.

The third mode by which bleeding proves serviceable, is by facilitating the re-establishment of the secreting functions.

Indication for venesection.

The indication for bleeding is a *hard* pulse. In this state of the pulse the diameter of the vessel is diminished, yet the action is exceedingly strong, and each pulsation of the artery feels like the vibration of a wire: whenever, therefore, you find this description of pulse, you will be justified in taking away blood.

Carditis and Pneumonia.

The hardest pulse that I ever met with was in a person who had inflammation of the heart; in inflammation of the lungs and of the brain the pulse is hard, but not to be compared to this. The pulse, however, is not always hard when inflammation attacks important parts. The contrary is sometimes the fact; for when the stomach or intestines is thus affected, the pulse is scarcely discoverable. Persons unacquainted with the nature of this fact, are frightened at seeing a man frequently bled, who has, for example, strangulated hernia, and will often exclaim, "Pray don't bleed him any more, see how pale he is, and his pulse is almost gone." Well, then, recollect, that in inflammations of the abdominal viscera the pulse is feeble; but inflammation of the liver, however, is an exception to this rule.

Necessary precaution for depletion.

Quickness of pulse is not in itself a sufficient proof that bleeding is requisite, but when united with hardness, no additional evidence of its necessity can be wanted; therefore, never bleed where there is a quick pulse, unless at the same time it be a hard one. The indication for a repetition of blood-letting is said to be a buffy state of the blood, but your decision must not be governed by this appearance, you must still have a hard pulse. When blood is cupped it is said to be a proof of strength, and that bleeding should be repeated; the following case, however, will show, that even a cupped state of the blood and buffiness conjoined, are not sufficient evidence to warrant a conclusion that venesection may be repeated. A man at Guy's Hospital, in the last state of scurvy, and whose blood-vessels were so weak, that a very slight pressure upon the skin produced ecchymosis, whose gums bled frequently, and whose pulse was exceedingly feeble and quick, had taken from his arm, at my request, a very small quantity of blood, by way of experiment; after standing for a few hours, it became not only buffy, but exceedingly cupped. When, therefore, you employ bleeding, it may be of importance to you to keep this experiment in your remembrance.

The quantity of blood which should be drawn at a time, in inflammation, must depend entirely on the severity of the complaint.

Quantity

The proportion of blood, compared with the solids, which can be

drawn from an animal before it dies, is about one pound to sixteen. I ascertained this fact in the following manner: I took a small dog, weighing fourteen pounds, and opened his jugular vein; in this way eleven ounces were discharged, when the dog fainted. I then opened the carotid artery, and from this source obtained three ounces more. Thus, fourteen ounces of blood were drawn from a dog weighing fourteen pounds; so that one ounce of blood to sixteen ounces of the solids is about the correct proportion.

Mode of bleeding.

When you bleed to relieve inflammation, the blood should be abstracted as rapidly as possible; therefore, the orifice made into the vessel should be of considerable size; for, if it be allowed to run slowly, the vessels have time to accommodate themselves to the diminished volume of circulating fluid; so that the system scarcely receives any shock when blood is abstracted in this gradual manner. The grand object, indeed, is to produce fainting; to effect which, blood must be suddenly withdrawn.

Case.

You may bleed so as to produce constitutional and local effects at the same time. A patient of Mr. Foster's, in Guy's Hospital, who had a concussion of the brain, was bled in the external jugular vein; immediately after the operation, the pain of the head ceased, and the irritable fever disappeared.

Bleeding in Chronic cases.

When you have accidents brought to you which will require a long time for their recovery, you must be exceedingly careful how you take away blood from the general system, but must adopt in these cases local depletion; for if, as I have before remarked, you take away from the constitution too much of the vital fluid, nature will be unable to execute the usual processes for the restoration of the injured parts; the most disastrous consequences, in such cases, follow the indiscriminate employment of blood-letting; and there is not to be found, in the whole range of surgical practice, a greater error than this, as the following case will illustrate. A fine young man, in the very prime of life, was admitted into Guy's Hospital, with simple fracture of the humerus, with slight abrasion of the fore-arm. Some time after his admission, he appeared to labour under constitutional irritation, and local pain near the seat of injury.

Case of a patient bled to death.

To relieve these, the dresser was ordered to take some blood from the arm; which he did; but not having the fear of a *lancet* before his eyes, and forgetting that his patient was in the recumbent posture, he abstracted so large a quantity that he never rallied.

Secretions restored.

The second mode of relieving inflammation is by restoring the secretions; for whenever it occurs, at least in any violent degree, all the secretions are diminished or suppressed. The most important secretions are those of the liver, intestines, skin, and kidneys; and when these cease to perform their proper functions, irritative fever is the consequence. A deficiency of secretion in the alimentary canal is the cause of a great many of the diseases to which human beings are subject. The internal surface of the intestines is lined with glands; the tube itself, on an average, is twenty-seven feet in length, and three inches in circumference; thus there are here about a thousand inches of surface, from which, in health, continual secretion proceeds. What then must the result be of allowing such an extensive surface to remain inactive? Of course, the production and continuance of irritation and fever! To excite the intestinal canal to action, therefore, should be one of our first objects. This may be done by purgatives; and they afford relief in nearly the same manner as the abstraction of blood from the arm; for a pint of serum will frequently pass off with feculent matter, after taking a cathartic. Purgatives have likewise another good effect, independently of restoring the secretions from the intestinal tube, *viz.* that of carrying off whatever feculent matter may be lodged in the intestines; but I do not believe that much irritation is produced by the accumulation of fæces in comparison with that which takes place from a stoppage or deficiency of the secretions. I have met with several cases in which a vast quantity of fæces had collected, yet little constitutional irritation was produced; similar cases frequently come under the observation of accoucheurs. In one instance, which I met with, the pressure from the fæces was so violent that it produced ulceration into the vagina; yet the amazing quantity of feculent matter excited but little constitutional irritation. Some fluid formed a passage by the side of the

Purgatives.

condensed mass, and was daily discharged; this, in a great measure, accounts for the absence of irritative fever.

Irritative fever arising from impeded secretion.

That it is from the check to the secretions that irritative fever arises, is proved by what happens in children during dentition. They are sometimes put to bed quite well, but in the morning half of the body is paralysed from the irritation of a tooth. The secretion from the intestines stops, fever is excited, which produces a hot and dry skin; but restore these secretions, by the administration of purgatives and antimonials, and the irritative fever soon subsides, although the paralysis will sometimes continue, with little alteration, for life.

Purgatives are counter-irritants.

There is another mode in which purgatives produce a beneficial effect in inflammation, that of irritating the intestines. Blood is determined to them, and is therefore drawn from the part inflamed, upon the principle that two increased actions are with difficulty kept up in the body at the same time.

Action on the Liver.

It is of no use to act on the intestines in inflammation, without also exciting the liver; therefore, give calomel with your saline medicines, but do not give salines alone; the best plan is to give calomel at night, and a saline in the morning. An excellent aperient for adults is one grain of calomel, with four of cathartic extract; or two of blue pill, with three of cathartic extract. Castor oil may also be recommended; and, as another safe opening medicine, you may prescribe infusion of senna, with Epsom salts. In children, calomel, with rhubarb, scammony, or antimony, may be ordered as aperients; and in addition to these means, the use of injections, and the warm bath, are the best means of restoring the secretions of the digestive organs.

Anecdote.

An old Scotch physician, for whom I had a great respect, and whom I frequently met in the city, used to say to me, as we were about to enter our patient's room together, "Weel, Mister Cooper, we ha' only twa things to keep in mind, and they'll serve us for here and hereafter; one is auways to ha' the fear o' the Lord before our e'en, that 'll do for hereafter; and the t' other is to keep our boo'els auways open, and that 'll do for here."

Mode of preserving health.

The methods by which I preserve my own health are temperance, early rising, and sponging the body every morning with cold water immediately after getting out of bed, a practice which I have adopted for thirty years; and though I go from the hot theatre into the squares of the hospital, in the severest winter nights, with merely silk stockings on my legs, yet I scarcely ever have a cold. Should it happen that I feel indisposed, my never-failing remedy is one grain of calomel combined with four of cathartic extract, which I take at night; with a basin of hot tea, about two hours before I rise the following morning, in order to excite a free perspiration, and my indisposition soon subsides.

Perspiration.

The next secretion we should restore, for relieving irritation and inflammation, is that of the skin; for it rarely happens, that a hard pulse continues with a free secretion from the surface of the body.

The best mode of producing perspiration is, by giving the antimonial powder with diluents, or Dover's powder; as this powder, however, is apt to increase costiveness, the antimonials are the best, and these should be combined with mercurials.

The other secretion, namely, that of the kidneys, may be restored, by giving diluents, squills, or acetate of potash.

Now, gentlemen, be assured it is not by restoring this or that secretion, which will relieve extensive inflammation; for it cannot be effected but by the complete restoration of them all.

There are some cases of inflammation where bleeding will not afford relief; this more frequently happens in inflammation of the testicles, than in any other part; for these affections, you must administer Dover's powder, combined with calomel.

Nausea.

There is another mode of subduing inflammation, namely, provoking in the stomach a constant nausea, by giving a solution of emetic tartar. I have seen this plan successfully practised on children in croup; calomel should be also occasionally administered.

Case.

In inflammation of old people, you must bleed with great caution. I was requested to see an elderly lady in the country, having inflamed lungs; I ordered her to be bled—the bleeding was repeated, when her legs began to swell; I therefore prescribed the digitalis

and the spir. æth. nitrici; it reduced the pulse, caused the absorption of the effused fluid in the legs, and she rapidly recovered. This medicine reduced the inflammation, and at the same time increased power.

The means, therefore, which are employed to lessen or remove inflammation, are those which restore the secretions, by opening the extremities of the arteries; and thus the heart is prevented from propelling a quantity of blood with violence to any particular part of the body. Summary.

TREATMENT OF CHRONIC INFLAMMATION.

The remedies employed in this affection must have a slow and gradual action on the secretions, you cannot take this disease by storm; and, if your medicines are attended by violent actions, you will do harm instead of good. The principle on which this disease depends, is the same as in acute inflammation, *viz.* the arrest of the secretions. Chronic inflammation is frequently produced through the influence of the mind: thus, long continued grief will completely stop the secretion of bile; again, loss of appetite, from a deficient secretion of gastric juice, is often occasioned by anxiety of mind; and even an ulcerated state of the stomach has been produced by a long continuance of the same cause. But let what will cause the stoppage of the secretion, some enlargement will be the result; as swelling of the liver, of the testicles, or of the joints; the formation of common tumours, as the fatty, or those of a specific kind, as the fungous. Treatment of chronic inflammation.

In diseases of a chronic kind, give calomel and opium; and I cannot point out to you a better example of their good effects than is observable in chronic inflammation of the iris. A person comes into the hospital with iritis; he has a zone of red vessels round the cornea, on the sclerotic coat, and there are red or yellow spots on the iris; if the complaint has been violent, the spots are red, from their having become vascular. You give this patient five grains of calomel, and one grain of opium, twice a day for a fortnight, and

he generally gets well. Yet this disease was formerly considered incurable. If the patient be a female, or of a delicate constitution, then two or three grains of calomel will be found sufficient; and when the mouth becomes decidedly affected, you will perceive an alteration in the appearance of the iris, when you should lessen your dose; a profuse salivation is not necessary, and, if long continued, would aggravate rather than relieve the local disease.

The most common medicine, and probably as a general one, the best that is administered in chronic inflammation, is Plummer's pill; it acts at one and the same time on the secretions of the liver, intestines, and skin; and if you can succeed in restoring these, the disease, if recent, will soon disappear: the absorbent vessels are roused into a state of increased activity, and the effects of the chronic inflammation are removed.

Another remedy.

Another excellent medicine for the cure of chronic complaints, is the oxymuriate of mercury, combined with the compound decoction of sarsaparilla. In the hospitals we merely give it dissolved in rectified spirits of wine; about one-eighth of a grain, in half a pint of the decoction, to be taken in the course of a day; one-half in the morning, and the other in the evening; continue it as long as you think necessary, taking care to watch its effects on the gums; always keeping in mind, that mercury given to excess will tend to increase, rather than destroy, constitutional irritation. As sarsaparilla seems to possess the power of lessening irritability, we frequently give it with mercury, in the way I have just mentioned; it is a medicine which has often a most extraordinary effect on opacities of the cornea, and may be prescribed, in even very bad cases, with the greatest prospect of success. A girl from Sheerness, was in Guy's Hospital some time since, in whom the opacity was so great, that she was nearly blind; quite so in one eye: the usual remedies employed in similar cases were tried, without obtaining the least benefit; she was then recommended the compound decoction of sarsaparilla, with the oxymuriate of mercury, and in a short time she recovered her sight.

Case.

Chronic inflammation in children.

The best alterative for the removal of chronic disorders in chil-

dren, is one grain of the hydrarg. cum cretâ, and two or three grains of powdered rhubarb, mixed together, and given night and morning: this compound is exceedingly mild, and will have a particularly benign influence on the liver and intestines. One grain of oxymuriate of mercury, dissolved in an ounce of tincture of bark, and from ten to fifteen drops, according to the age of the child, being given twice a day, will likewise be found a very valuable medicine. It is said, that oxymuriate is decomposed by the bark; but, whether it be so or not, it is attended with so many good effects, that I shall continue to prescribe it; and especially in those cases where there is enlargement of the mesenteric glands. Calomel and rhubarb, the hydr. cum cretâ, and soda, will also be found medicines of much power in the chronic diseases of children.

Powder for infants.

Lastly, as it is not advisable to give these little creatures mercury, if it can be avoided, a medicine, composed of two grains of rhubarb, and five grains of the carbonate of iron, given two or three times a-day, will often render its employment unnecessary: this medicine acts as an aperient and powerful tonic.

The nature of inflammation I hope you all now thoroughly understand; recollect that the vessels of the part are in a dilated state, and the surrounding ones have an increased action.

I shall next speak of the

LOCAL TREATMENT OF INFLAMMATION.

Local treatment of inflammation.

Much has been said about the application of cold in these affections. People have been arguing about words rather than ideas, but it really is not worth while to attend to such fastidious, nonsensical objections as have been started against this remedy. Though cold is not a positive agent, yet it is capable of affording great relief in inflammation; first, by lessening the size of the vessels; secondly, by lessening action, which it effects by diminishing nervous irritability. If cold be applied to the system generally, it has the power of lessening the frequency of the pulse in an extraordinary degree. I have tried this upon myself. I went out of my house

Effects of cold

one evening into the garden, when warm, my pulse being 86; at the expiration of an hour it was 76; at the end of two hours, it was reduced to 65; and had not only lessened in quickness, but also in fulness. Cold will produce torpor, and even death.

Anecdote. A curious instance of this kind occurred near Halifax, in Nova Scotia: Dr. Scott had been dining a little way in the country with some friends, and they were on their return at night, when one of the party separated from the rest, saying to a companion, that he would frighten some of them by-and-by. However, they reached Halifax without seeing any thing more of him. At this the party became alarmed for his safety, and returned for the purpose of finding him. He was discovered behind a hillock of snow, in an erect position, but quite dead.

Anecdote. Another curious instance of this kind is related in Cook's Voyages, when some of the officers and crew of one of the ships were landing at Terra del Fuego. Dr. Solander, who was of the party, particularly cautioned them not to go to sleep; and said that it was exceedingly dangerous to do so in cold situations. It happened, however, that the Doctor was himself the first who became drowsy; it was with the greatest difficulty that his companions could keep him in motion; and it was only by the utmost perseverance that they succeeded in getting him back to the ship alive.

Effect of cold. When cold is applied to an inflamed part, it lessens its nervous energy, and robs it of its heat; but cold must be severe indeed, if it bring the *internal* parts of the body below a temperature of 98°. In this country, in the winter, many of the *external* parts of the body vary in temperature from 20° to 30°; thus a thermometer applied to the toes when they are cold, will be found to indicate 20° of heat less than it would, if applied to the calf of the leg. Cold, applied in excess, destroys life, by extracting heat, without which the vital actions cannot be supported.

Case. On the living body you may apply cold to a part until it actually becomes frozen. Mr. Cline and Mr. Sharp were once attending a patient who had strangulated hernia; to reduce which they applied ice enclosed in linen cloths, and this they continued for thirty-six

hours: now as the ice dissolved, the water formed by it ran down upon the man's groin, and the inner side of his thigh, and the parts whereon this stream passed, became completely frozen; proper applications restored them to life; but inflammation and slight mortification succeeded: the hernia, however, was reduced, and the man eventually did well. In similar cases, I advise you to apply ice in a bladder; and take care that you do not continue it too long.

Snow applied to frozen parts.

It frequently happens in this country, during severe winters, that the lobes of the ears and tips of the noses of those who are much exposed to the weather will become frozen: they may be restored to life by rubbing them with snow.

Goulard water.

One of the best lotions that can be applied to an inflamed part is composed of one ounce of rectified spirits of wine, and five ounces of water. Goulard water is also much extolled for reducing inflammation, and lessening pain; but when too long applied, or too strong, it has been known to destroy nervous irritability in too great a degree. Mr. Foster, of Guy's, saw a person in whom the upper eye-lid became completely paralysed from its improper application.

In applying the spirit-of-wine lotion, let your cloths be thin, so that the spirit may combine with the heat of the part, and carry it off in the form of vapour; in other words evaporation is produced, and it is in that way its good effects are produced.

Ice.

I do not recommend the application of ice to parts while in a state of inflammation; it irritates, and is apt to produce gangrene.

Experiment.

Some years since, when I was making a series of physiological experiments, I wished to ascertain what effects would be produced upon the pulse by the sudden application of severe cold, for which purpose I plunged my arm to the shoulder into snow; at the time of the immersion my pulse was 80, but immediately rose to 120; this result was contrary to all that I had ever been taught on the subject—the pulse sometimes did not rise so high as 120, not being more than 110, and was hard and wiry. The immersion in so great a degree of cold caused great pain, and consequently was a source of irritation. This experiment led me into an examination of the

Effects of the cold bath

effects of the application of the cold bath; I found that when a person in health took a cold bath, who was unaccustomed to do so, that it produced irritation; but on the contrary, when a person in a state of irritation, or febrile heat, went into a cold bath, it tranquillized the nervous action, and exerted a beneficial influence.

At one time, I had injured my health by being too much in the dissecting-room, and was in the habit of discharging from my stomach a good deal of blood; a considerable degree of sympathetic fever was the consequence; in this condition I went into the country, for the benefit of a pure atmosphere, and there had frequent opportunities of noticing the influence of cold upon an irritable pulse, in my own person. Of an evening, when in the house, my pulse would be at 120, but upon going out into the cold air, it sunk in a very short time to 100, and by a long continuance in the cold, it became still less frequent. Thus, where there is great irritability of the nervous system, and where the heart is sending its blood through the different channels with accelerated motion, cold will prove invigorating, by destroying the first of these affections, and reducing the latter to the natural standard.

In a word, therefore, cold relieves inflammation when locally applied—by abstracting heat—by lessening the diameter of the blood-vessels—and by diminishing the action of the part, through lessening its nervous irritability.

Heat and moisture

The next mode of relieving inflammation is by the application of heat and moisture; this looks like contradiction, but it is not so. It would be a contradiction to apply heat alone, and its application would certainly do harm; but the reverse is the result, when united with moisture; for the two produce relaxation, open the pores, give rise to perspiration, thereby removing congestion, and occasioning all the beneficial effects that would arise from the application of leeches. The sedative effects of heat and moisture are well exemplified by what happens when a person takes a warm bath; a man, for instance, with a pulse at 75, goes into water heated to 100 degrees; his pulse soon rises to 100, presently he perspires freely, his pulse becomes less frequent, yet soft; great relaxation follows,

and if he were not removed, he would absolutely die, so extensive is the exhaustion that it occasions. Here, then, is direct proof of what heat and moisture can do, when they are applied generally; and, when used locally, their action on the part is precisely the same.

Fomentations are ordered precisely with the same view, *viz.* to restore the secretions of the part, by which the tension of the vessels is removed, and the pain much abated. Fomentations occasionally are medicated, being composed of camomile flowers, poppy-heads, &c., but I do not consider that these possess any advantage over mere water, at least where the surface of the skin is unbroken. Fomentations.

Poultices are likewise used upon the same principle; the kind of poultice is of little consequence, provided, as in the preceding case, the skin be entire. Poultices.

The next method of relieving inflammation is by the application of leeches, which relieve upon the same principle as poultices and fomentations, *viz.* by abstracting from the part a portion of its fluids, and consequently lessening the pain and tension: after the leeches drop off, the bleeding must be encouraged; this may be done by bathing the part with warm water, and wiping it frequently with a warm sponge. Leeches.

To some persons, and in some situations, however, the application of leeches is attended with very great inconvenience; as occasionally, for example, in inflammation of the testicles. We do not find this an inconvenience in the hospitals; but frequently, in private practice, we see persons in whom it is of the greatest consequence that a bleeding from these parts should be concealed. Now, as there is much mess, trouble, and consequent exposure, from an application of leeches, what we do in such cases is this: we request the person to stand before us, and, with a lancet, puncture some of the small veins on the front of the scrotum; in this manner, and with a little warm water, you abstract any portion of blood you wish; and what is of very great consequence, you stop it when you please; for, by placing the patient in a recumbent posture, and by applying some cold water to the punctures, the Where Leeches are inconvenient.

blood will immediately cease to flow. In this way, then, you may take blood from the scrotum, when the testicles are inflamed, with very little trouble, and without any exposure. In deep seated inflammation, blood should also be taken by cupping.

[The learned Lecturer here said, at the same time putting his hand upon one of the recently amputated stumps lying upon the table, that he had a few more remarks to make, but these would be on another subject: *viz.*—the occasional retraction of the skin of a stump, after amputation.]

Case.

A surgeon, at Worthing, took off a boy's arm, pretty near the shoulder-joint; the stump healed kindly, and all was thought to be doing well: some months after, however, he complained of pain, and the skin retracted to such an extent, that the bone projected through it at least an inch; in this state, he came to town, and upon examining the part near the arm-pit, I put my finger upon a small tumour; this occasioned the boy to jump as though he had been electrified; I then performed the operation of amputation at the shoulder-joint, and upon examination, it was found that the tumour which had been touched before the operation, and produced the electric shock, was a large ganglion of nerves, and it had given rise to the excessive irritability of the stump, and the retraction of the skin.

Case.

Previously to the above case, a boy was sent to me, with a stump similar to the one I have just described, but in the leg; the ends of the bones were cut off, and the boy left the hospital apparently well; but soon after the arm case from Worthing had been operated upon, and the nature of the disease ascertained, this boy again returned, having his stump in a painful, irritable state, and the skin evidently retracted. Knowing now the cause of the mischief, I cut down upon, and took out the end of the posterior tibial nerve: the bad symptoms consequently disappeared, and the lad eventually recovered.

Case of irritable nerve.

Going round the hospital the other day, I met with another case resembling the above, but, in point of irritability, much worse. At the particular request of the woman, I amputated—the nerves ap-

peared to be enlarged, and had formed a ganglion partially resting on the extremity of the bone; this had produced such a degree of irritation, that no part of the stump could be touched without exciting a kind of electric shock; in fact, the woman appeared very much to resemble a sensitive plant.

How the nerves become longer than the bones in these cases, does not admit of easy explanation.

LECTURE VI.

COUNTER-IRRITATION IN INFLAMMATION.

Local treatment of chronic inflammation.

In the acute, as has already been explained to you, our object is to diminish vascular action; but in the chronic we endeavour to increase it. Thus, in long-continued discharges arising from relaxation, we employ stimulating lotions, for the purpose of restoring to the vessels their healthy power of contraction. Again, in sluggish, indolent ulcers, it is absolutely necessary to excite action; for which purpose we employ washes, either composed of calomel and lime water, or the hydr. oxymur, and lime water; the cupri sulphas is also an admirable remedy in these indolent sores. Gonorrhœa, as I have already shown to you, gives us an excellent illustration of the difference between acute inflammation and chronic, and the principles upon which your opposite treatment must be founded to insure a successful result. At first you diminish strength and action, and then stimulate, for the purpose of restoring them.

Mode of applying stimulating lotions.

Whenever you apply stimulating lotions to indolent ulcers, you should always cover the parts with oiled silk; to prevent evaporation, by which cold would be produced, and the design with which it was applied frustrated. Your object here is to obtain heat and action; as oiled silk obstructs evaporation, it very materially contributes to create these: and, as the perspiration as well as the vapour from lotions condenses upon the inner surface of the oiled silk, it of course succeeds in keeping the part moist; and this is a

very great advantage, as it enables you to remove your applications without disturbing the new skin. Now, where this covering is not used, the linen over the wound becomes dry, adheres to the newly-formed skin, and consequently, when you take away one, the other must come with it: in this manner the restorative efforts of nature for twenty-four hours will often be defeated in a single minute.

The next method of treatment which we shall mention is that of counter-irritation.

Counter irritation.

The power of this remedy is very great, and its advantages numerous; but the chief benefit that results from its employment, arises from its drawing off the blood from the neighbouring inflamed parts, whereby it checks the course of disease in important organs: thus, a blister at the nape of the neck, if early applied, will arrest an inflammation of the brain; a blister at the pit of the stomach will frequently overcome an inflammation of that viscus; a stimulating irritating lotion applied to the scrotum will often cure an inflammation of the testicle. But counter-irritation, carried to excess, will do harm; you must, therefore, be particularly cautious as to the manner in which you use it. In parts that have no immediate connexion, it is really astonishing to observe its effects. In inflammation of the lungs, a blister applied upon the chest (parts between which there is no direct communication) will soon stop the disease, and be to the patient the principal cause of recovery. Blisters, likewise, applied to the front of the body, as on the abdomen, are extremely useful for the removal of inflammations of the liver, intestines, &c.

Blisters.

Blisters are more generally used by surgeons for exciting counter-irritation than any other application. Issues and setons are also occasionally adopted. I again caution you against exciting such a degree of irritation as would affect the whole system: if you were to allow this to happen, you would aggravate the original disease; it must therefore be limited, and kept within proper bounds. Sometimes, after the blister has been removed, it may be deemed prudent to keep the wound open; this you can accomplish by removing the loose cuticle, and by dressing the sore with savine ointment.

Another mode of producing counter-irritation is by the application of tartarized antimony made into an ointment. This is a very excellent method, and is now very generally adopted. You must be careful, however, on what surfaces you apply it, if you intend to excite irritation in a great degree, as it is apt, permanently, to disfigure the skin. I saw a young lady who had used it on the arm for a chronic inflammation of the elbow joint. She was offended with her medical attendants for having recommended its employment, as it left a scar near the elbow which has since obliged her to wear long sleeves. Such a defect you would not like to see in your sister or friend; therefore, it is nothing more than right that you should endeavour to obviate its occurrence; and this you may always do by proper attention. Tartarized antimony.

The next circumstance to be attended to in the treatment of inflammation is position. Medical men do not consider the human body as an hydraulic machine; nor indeed is it so; but still the fluids of the body are, in some measure, governed by the laws of gravity. Look at the operation that I spoke of in the last lecture, for relieving inflammation of the testicle. If you puncture the veins in front of the scrotum, and if the patient be in the erect position, blood will freely flow; but put him in a recumbent position, the stream will immediately cease; though, when the body is thus placed, the power of the heart is greater than when in the erect position. Posture.

If, during the ensuing winter, I should be called to any of you having inflammation in the hand, arising from punctures inflicted while dissecting, I should immediately direct you to get an inclined plane made, upon which I should order you to rest your hand as long as the inflammation was at all violent. Punctures; to be placed on an inclined plane.

It is equally necessary to attend to position in inflammation of the leg. I must give you an example; I was sent for, to see a gentleman farmer in the neighbourhood of Rayleigh, in Essex, who for a long time had been subject to a very severe inflammation in both his legs; they were exceedingly red and very much swollen, in a state threatening gangrene; the constitutional irritation was very Position in inflammation of the leg.

Case.

great, and the tongue covered with a brown fur. I found him with his legs in a tub of water; I took out one of them, and it smoked excessively; I saw there was no time to be lost, had him immediately placed upon a sofa, and contrived to rest his legs upon the end of the sofa; consequently they were raised considerably higher than, his body; the vessels soon began to unload themselves, and the skin, in a short time, was evidently less red than when taken out of the water. I then applied flannels wrung out of warm water; these soon produced a very considerable perspiration, by which the cellular membrane became unloaded, the swelling much less, and the pain materially abated. He gradually recovered, and in six weeks was enabled to ride a considerable distance to market.

The completest tyro in surgery ought to know, that it would be folly to attempt to cure extensive inflammation in a limb, if it were allowed to continue in a depending position.

Rest

The next circumstance to be attended to in the treatment of inflammation is rest; the necessity of which must be well known to you, as all of you must have observed that exercise increases the action of the heart, and consequently, must be injurious in inflammation. To obtain rest for an inflamed joint is one of our grand principles in the treatment, and no good can be done without it: it is curious to observe how nature herself directs this; for where a joint is diseased, the muscles which act upon that joint have lost their power: thus, if a man has an inflammation of the wrist, and you put your hand into his and desire him to squeeze it, you find that he cannot do so, or that the attempt is exceedingly feeble. In inflammations of the joints of the lower extremities, the muscles of the part in like manner lose their vigour.

Indurations.

Indurations frequently remain after inflammation has entirely ceased; these are to be got rid of by diminishing the circulation of the part, and producing absorption by the following methods:—

Pressure.

Pressure has the power of exciting the action of the absorbents in an extraordinary degree; and you may produce it either by the use of rollers or strapping.

Electricity, too, is attended with similar effects; it acts strongly on the absorbent system. Electricity.

Mercury, likewise, does the same; and, speaking generally, more decidedly so than either of the other remedies I have mentioned. Mercury.

When a man dies in our foul wards, for example, in a state of salivation, we find that the alveolar processes which contained the teeth have been in a great measure absorbed.

Friction has, of late years, got into great repute, for the cure of indurated and stiffened joints, occasioned by inflammation; it was first recommended by the late Mr. Grosvenor, of Oxford, a man of strong mind, and who possessed a great share of common sense. This remedy was his hobby; and, like all other hobbies, it occasionally carried its rider into the mire; for Mr. Grosvenor sometimes would recommend friction before the acute inflammation had terminated, consequently it was productive of mischief rather than benefit; in many instances, however, where judiciously employed, the most beneficial results have been obtained. Friction.

A gentleman in the neighbourhood of Nottingham, when shooting, received a severe injury to his knee; after the violence of the first inflammatory symptoms had terminated, there remained considerable swelling, stiffness, and induration; for these he was attended by Mr. Attenborough, an eminent surgeon, of Nottingham; as the gentleman did not get better, Mr. Attenborough sent him to town, and here he for some time continued under my care, and that of a physician; still the joint remained in the same state, and the means used were inadequate to afford relief. I advised him to go to Oxford, and consult Mr. Grosvenor. This he did: and as soon as Mr. Grosvenor saw him, and heard that his limb had been kept quiet, he told him to walk to the bottom of Christ Church Meadow, and then return and dine, which he really did. Friction was used in this case with the greatest success, for, within six weeks after he went to Oxford, he called upon me in town, quite recovered, and thanked me for recommending him to Mr. Grosvenor. Case of friction.

Mode employed

Friction accelerates circulation and absorption; and the way in which Mr. Grosvenor recommended it to be done was, by applying both hands to the joints, at the same time alternately moving them up and down.

Case.

The late Mr. Hey, of Leeds, a man whose mind was free from every paltry prejudice, most eminent in his profession, and ever anxious for truth, had a son who met with a serious injury to his ankle-joint; after trying all he could to relieve it, he sent him to Mr. Grosvenor; and under his care, by the judicious application of friction, the actions of the joint were completely restored.

In cases of violence done to the joints, when the inflammation has been subdued, which it will be in a month or six weeks, friction and motion are very useful: but in chronic diseases of joints, many months of rest will often be required, before inflammation has sufficiently subsided to allow of friction and motion being safely used to prevent anchylosis.

LECTURE VII.

ADHESIVE INFLAMMATION.

For a knowledge of this process we are indebted to that bright luminary of our profession, the late Mr. John Hunter, a man who was abused, reviled, and laughed at, when living, by the very persons who, now that they cannot any longer injure him, are ever loading his name with every species of commendation and praise.

Effects of inflammation on the blood.

Adhesive inflammation is the process by which divided parts become united.

Inflammation has a disposition to separate the blood into more parts than usually occur when drawn from a person in health. In health, it merely separates into serum and red particles; but, when in a state of inflammation, if, after being drawn, it be allowed to remain undisturbed, it will separate into serum, red particles, and fibrin. The red particles, together with some fibrin, will be found at the bottom of the vessel; the fibrin immediately on the top of

the red particles, forming what is called the buff of the blood; and the serum will occupy the surrounding space. The fibrin, having lost the red particles, contracts with great firmness, and when taken out, almost resembles a piece of leather. It has been said, that the adhesive matter is albumen; but it has been proved not to be so. Dr. Bostock, who was for several years at Guy's Hospital, took great pains to investigate its nature, and published several papers on the subject, in the *Medico-Chirurgical Transactions*: he named it fibrin. Mr. Hunter called it coagulable lymph; this certainly was not a good term to be applied to such a substance, for lymph is expressive of, and relates to, water; whereas fibrin is not only a solid, but an exceedingly firm one.

Effect on the membranes.

Some surfaces of the body are serous, while others are mucous. The cellular membrane is one of the former, and usually exhales a fluid somewhat resembling serum, but containing much less albumen. This membrane is very liable to the adhesive inflammation. The vessels that usually secrete the fluid just mentioned, when the part is inflamed, pour out fibrin, which, becoming coagulated, produces the hardness which we usually find in inflamed parts.

On the peritoneum.

The peritoneum, a membrane which doubly encloses the intestines, is a serous surface, often affected by the adhesive inflammation, which occasions the two surfaces of this membrane to be firmly glued together.

On the pleura.

But the part of all others the most subject to this kind of inflammation is the pleura, and we scarcely ever open a body without finding upon its surface many unnatural adhesions.

On the pericardium and dura mater.

The heart, in like manner, is often glued to the pericardium, so that the space usually found between the two portions of membrane is obliterated; and in the membranes of the brain we frequently meet with partial adhesions between the dura mater and tunica arachnoides.

Wise provision of nature.

Thus, then, it will be seen that the serous membranes readily take on the adhesive inflammation, by which they become permanently attached to each other, or to the adjacent parts; this is a most beautiful and wise provision of nature, for if the membranes

of cavities, such as the pleura and peritoneum, instead of the adhesive, were to receive and support the suppurative inflammation, effusion and death would be the inevitable consequences. For example, matter would be often formed in the cavity of the pleura, and empyema would generally destroy.

Effects on the urethra.

The mucous membranes, as the urethra, for example, are affected by the suppurative inflammation. This is another of nature's benevolent and wise ordinances; for, had they been subject to the adhesive, the outlets of our bodies would have closed, and life destroyed. Sometimes where inflammation of a mucous membrane is exceedingly violent, it passes into the adhesive inflammation, glues the parts together, and, unless relieved by an operation, would end in the destruction of life. I can relate to you an example of this: there was brought to me from Exeter 'Change a kangaroo for dissection. His bed of straw had caught fire, but it was very soon extinguished; and the proprietor, knowing that he had not been severely burned, was at a loss to account for his death. Upon examination, his bladder was filled with urine, which was retained in consequence of the closure of the urethra by the adhesive inflammation; the penis having been severely injured by the fire, the inflammation which followed was violent, and passed at once into the adhesive form. Thus you may perceive that common gonorrhœa would destroy life, if it were not so arranged by nature that mucous membranes are more readily influenced by the suppurative than by adhesive inflammation.

Trachea.

When inflammation attacks the air-tube, it usually happens, that the mucus, which it secretes, becomes purulent; but in very violent inflammation, adhesive matter is effused, and produces the disease which is called croup. If the larynx be the seat of this disease, it frequently destroys life; but when the inflammation is seated in one of the bronchiæ, the adhesive matter is coughed up, in an arborescent form, and the patient recovers.

APPEARANCES UNDER ADHESIVE INFLAMMATION.

Nature of adhesive matter

When an incision is made into a part affected with adhesive inflam-

matter—into the cellular membrane, for instance—a quantity of serum is found effused round the part, and in the part itself a yellow and semi-transparent substance, having the appearance of jelly, though widely different from it in composition. The best opportunity that you can have of witnessing the adhesive inflammation is on the skin under the irritation of a blister; the blister produces the same effects as those produced in the operation for hydrocele. Let a blister be applied for twenty-four hours, till the cuticle is raised: then make an incision into the vesicles, and a quantity of serum will escape. Here, perhaps, your observation may terminate; but examine the surface, and you will find on it a yellow substance, which will exist in a greater or less degree, according to the length of time the blister has been applied, also on its severity, and on the irritability of the skin; but, generally speaking, under the application of a blister, adhesive matter is thrown out as under adhesive inflammation.

Time required for the production of adhesion.

For those who are anxious to know the time required before the adhesive inflammation commences, it may be proper to state, that it is different according to the structure of the part and nature of the constitution. In the cavity of the abdomen, the intestines will be glued together in nineteen hours after the adhesive inflammation has begun. Now I mention nineteen hours particularly, because I have seen it produced after that time in cases of gunshot wounds. It may be in the recollection of some of you, that a Mr. Blight was shot by a man called Patch, in the neighbourhood of Deptford: the ball traversed the abdomen. I was called to this case, and Mr. Blight died in nineteen hours after he had received the injury. Here I had an opportunity of seeing what I have just mentioned; the intestines were glued to each other, and to the peritoneum; the peritoneal surface had quantities of adhesive matter on it, and was firmly united to the surrounding intestines. On the surface of wounds, the process of adhesion takes place rapidly; for, if a piece of lint be applied to a newly-made wound, in twelve hours it will be glued to its surface; in a dog, the adhesive process commences in six hours.

Adhesive matter, when effused on a thin membrane, coagulates into a net-work, assuming the character of cellular membrane.

Organization of adhesive matter.

When adhesive matter has been formed, blood-vessels soon enter it, and within a short time it becomes organized; the vasa vasorum are elongated by the force of the circulation: they enter the newly-formed substance, and send throughout it minute ramifications. On cutting into adhesive matter within twenty-four hours after it has been deposited, small bloody spots may be seen, which mark the future situation of the vessels which nourish it; but it is not till ten days after it has been formed that adhesive matter becomes completely organized; for you will find, that a fine injection would not enter adhesive matter sooner than the tenth or eleventh day after its formation. When vessels elongate, they have not the character of arteries; in general, they take a serpentine or tortuous course.

Hunter's opinion.

Some thought, at one time, and I believe Mr. Hunter was one of this opinion, that the vessels originated in the newly-formed substance; but they are formed by the elongation of the vasa vasorum of the surrounding arteries, which become dilated, lengthened, and serpentine: and the degree of vascularity will be in proportion to that of the part subjected to the adhesive inflammation. In tendons, for instance, it will be much less than in muscles.

Use of the adhesive inflammation.

This process is of the greatest possible consequence in surgery. It ought, therefore, to command much of your attention; and it will be unfortunate for you if you do not understand it. Without this process no operation could be attended with success; its absence, even after bleeding, would destroy life. Bear this principle in mind, then, gentlemen—always endeavour to effect union by adhesion. You have seen, during this present winter, a man admitted into Guy's Hospital, with a compound fracture, which was rendered simple by applying lint dipped in blood, and, in a fortnight, all danger from the accident was dissipated.

In compound fractures.

Suppose you were called to a compound fracture, what would you do? Endeavour, certainly, by bringing the parts together, to

make it a simple one. Within these few days you have had an opportunity of witnessing the fatal consequences of hemorrhage in a case of compound fracture; if the adhesive process had taken place, hemorrhage would have been prevented, constitutional irritation kept off, and recovery, in all probability, rendered sure.

It is the same in formidable operations; the Cæsarean operation, which consists in making an incision in the course of the linea alba, for the purpose of extracting a fœtus from the womb, is not dangerous, if the adhesive process takes place; now and then, from hemorrhage and exhaustion, it proves serious; but in most cases, the danger is slight, if union by adhesion be procured. To exemplify this by the operation for cataract: in this operation a wound is made in the eye—more than half of the cornea is cut; if the adhesive process take place within twelve hours, the flaps begin to adhere, and in twenty-four they are consolidated. Suppose, on the contrary, they do not adhere—violent inflammation supervenes, and the result is destruction to the eye of the patient; the success of the operation depends then, in this instance, on the adhesive process. In a person who had been in ill health, the inflammation might be too weak, and in another case it might be too strong; suppuration would be the consequence in both instances; the same effect results in the two cases, though produced by very different causes. Again, in the operation for strangulated hernia, an opening is made into the hernial sac, which communicates with the cavity of the abdomen; and, if the parts are not afterwards united by the adhesive process, the patient dies. In operations.

In the operation for aneurism, it is adhesive inflammation which saves life; a ligature is applied to the artery, a coagulum of blood forms, the adhesive process commences, fibrin is poured out, and the internal coats of the artery are glued together; but for this, when the ligature gave way, hemorrhage would ensue. Aneurism.

In the operation for the radical cure of hydrocele, we have a beautiful opportunity of witnessing the effects of adhesive inflammation. After the water has been evacuated, a stimulating injection being thrown into the cavity excites upon its sides an irritation; Hydrocele.

inflammation is set up, adhesive matter thrown out, the internal surface of the cavity generally becomes permanently united, and thus a radical cure is effected. If an incision be required to be made into the tunica vaginalis, whilst it is suffering from the adhesive inflammation, its cavity is found filled with a substance which has the appearance of jelly.

Example

The treatment of a stump after amputation will best illustrate this subject. In amputating a limb, your object is first to preserve sufficient integuments, and not muscles, for if muscular fibres are preserved with the integuments, they will contract, and retraction of the skin covering the stump will be the result. When the limb has been removed, you will apply ligatures to the bleeding vessels: now I would not advise you to tie every small vessel; ligatures on the principal vessels are quite sufficient, and the fewer applied the better, for though it is desirable to prevent disturbance of the limb afterwards, yet, by waiting a short time after the operation, the smaller arteries will generally stop.

Ligatures.

The ligatures themselves should be small, and consist of fine silk, for nothing is so bad in operations as the application of coarse ligatures, excepting perhaps in cases where ossification of the arteries has taken place, when it would be justifiable; with this exception only, it is the worst possible surgery to apply thick ligatures to arteries; and if a surgeon were to do it, he would understand nothing of his profession; the thinner the ligatures are, then, the better.

Difference of ligatures.

Now there are two reasons why thin ligatures are preferable—1st, because they are less liable to escape; 2dly, they divide the internal coats of the arteries more effectually: when you use a very fine ligature, the internal coats will be completely divided, and the external will remain entire. My friend Dr. Jones has published an excellent work on the natural means by which arteries unite in cases where ligatures are applied; and first he states the fact of the internal coats of the artery being divided by the application of fine ligatures. Thick ligatures also prevent the wounds from healing so rapidly as thin ones. After the vessels have been secured, the

sponge should be applied, and all coagula of blood removed, as this is very essential to the union of the part; blood is not the means but the prevention of union in such cases, for unless it be taken away, the adhesive inflammation will not go on. There is one instance in which blood favours the process of adhesion, and that is in the application of a ligature on an artery; with this exception only, the opinion of blood favouring the process of adhesion is to be banished from your minds, for there are but two modes by which union can be effected, *viz.* by adhesion, and by granulation; therefore remove all clots of blood, which will only act as extraneous bodies and keep up irritation. You are to cut off one end of the ligature close to the vessel, and let the other hang out of the wound: it has been recommended to cut off both ends of the ligature close to the vessel; this plan has, however, been already given up.

Effect of ligatures.

This was determined by Mr. Hunter, in the first operation he performed for aneurism on the trunk of the artery above the tumour, instead of on the aneurism itself; for in that instance he cut the ligature close to the knot, and copious suppuration afterwards took place. Ligatures can only bo removed from the vessels by suppuration or absorption (in the latter case they must be first dissolved and then removed by the absorbents;) and conceiving that if a ligature, composed of a substance easily soluble, were applied to a vessel, and cut close to the knot, it might be dissolved, and then absorbed, I applied a catgut one to the femoral artery of an old man, whom I operated on for popliteal aneurism, and cut it close to the vessel; this case turned out well, for adhesion followed and suppuration did not ensue.

Although successful here, I have tried it in several cases since, and have failed in all, suppuration always coming on afterwards. I applied a silk ligature to the carotid of a dog on one side, and a catgut one to the carotid on the opposite side: upon killing the dog some days afterwards, I found the second ligature (catgut) buried in a cyst, and that the first advanced by the process of ulceration to the side of the larynx. Experiment and observation show, then, that it is better to cut one end of the ligature off, and

to leave the other hanging from the mouth of the wound, to be removed when the ulcerative process is completed, which is from ten to fourteen days. Dr. Veitch, I believe, first advised the removal of half the ligature.

In amputation. After amputation, having disposed your ligatures in a line with each other, and leaving them to hang out at the most depending part of the wound, you will, if the limb be removed above the elbow or knee, apply a bandage, to prevent retraction of the muscles and extensive suppuration. I have seldom succeeded with my stumps above the knee when I have not used a roller; it is better to apply a roller in such cases, for the muscles will then be glued together, and form one consolidated mass. Having applied a roller, and brought the integuments together, I merely put three strips of adhesive plaster over the wound, and one round the stump, to keep the ends of the plaster in their place. It is curious to see the difference between the mode of dressing stumps now, and that adopted a few years ago; the old practice, was, after the adhesive plaster had been applied, to put some lint, then plaster again, after that tow, and, lastly, over the whole, a cap of flannel. If a surgeon were to do this now, he would be laughed out of the operating theatre, and very deservedly too, because he would prevent the success of the adhesive process by unduly heating the limb.

Old practice.

All that is necessary to do, is to apply three strips of adhesive plaster over the wound, and one circular piece; if the weather be hot, to apply the spirit of wine and water lotion, and if it be cool to keep the limb quiet. The object is to keep down the inflammation to the adhesive stage: if it goes beyond this, suppuration will be the result.

Dressing the stump. The last circumstance necessary to mention, is the impropriety of dressing the stump too early; a person anxious to see whether a union has taken place, removes the plasters in two or three days: he who does this overlooks the object in view, and must be shocked, when he looks at the stump, to see, that by the early removal of the plasters, he has destroyed all that nature had done. All you ought to do is, in four days after the operation, to remove one strip

of plaster, for the purpose of letting out any matter which might have collected. In six or eight days after the operation, it will be proper to dress the stump; but to do it before would be absurd.

The treatment which is applicable to stumps is proper also for common wounds.

Formation of cysts.

The adhesive process is useful in the formation of cysts. Balls encysted have been known to remain in the body for many years. Morgagni, if I recollect aright, mentions a case where a ball lodged in a cyst in the lungs for a considerable space of time. If the ball be not encysted, it travels, and absorption of the parts through which it passes takes place. A few days ago, a gentleman called on me, who had formerly received a wound above the zygomatic arch, from a ball; he now had a swelling on the side of his face. I asked him whether he thought it contained the ball; to which he replied, no: upon cutting on it, however, I found it was the ball by which he had been wounded some years before. It had travelled beneath the zygoma to the middle of the cheek, on the surface of the parotid gland, from whence I removed it. Perhaps it was assisted in its course by the action of the temporal muscle. I saw a boy, who had then been attending a target at which some volunteers had been firing: he thought himself safe at a distance of thirteen yards; he was mistaken, however, for one of them shot him in the collar-bone. Some months after, he came to Guy's Hospital, and I removed the ball from about the middle of the upper arm. Thus the ball, by its weight and pressure, had occasioned suppuration and ulceration, which had enabled it to travel to the situation from whence I extracted it.

Use of adhesive inflammation.

Another very important use of adhesive inflammation is that of its dividing cavities into distinct parts, by which means it fixes a boundary to the suppurative process; thus it will divide the cavity of the abdomen into two, by throwing out adhesive matter on the surface of the colon, by which it becomes glued to the peritoneum. In abscesses, a cyst is formed by the adhesive process round the matter, which prevents its escape into the surrounding cellular tissue.

In joints.

The advantage of adhesive inflammation is admirably shown in wounds of the joints. Immediately on the knee joint being opened, the synovia escapes, the person feels faint, looks pale, and the constitution appears to have received a severe shock. The wound endangers the loss of the limb and the patient's life, if bad treatment be adopted. If a poultice be applied to such a wound, or fomentations used, a suppurative inflammation will take place on the synovial surfaces; the cartilages become absorbed, and the bones ulcerated; a profuse discharge ensues, the constitution becomes extremely irritated; chills, succeeded by burning heat and profuse perspirations, frequently follow each other, and a person, just before in good health, is precipitated into a state of extreme debility. Sometimes the joint, after weeks, or even months have elapsed, gradually heals by granulation, with its motion either entirely gone or greatly impeded.

By sutures.

If, on the contrary, the practitioner brings the edges of the wound immediately together, and attempts union by the first intention, the patient generally escapes from local or constitutional irritation. The edges of the wound should be brought together by a fine suture—a plan, to which some surgeons object; but when the wound is direct into the joint, it affords additional security to the patient, as the escape of the synovia has a constant tendency to prevent adhesion, and to separate the plaster. The suture should penetrate the skin, the ligament being carefully avoided. A piece of lint wetted in the patient's blood is to be put over the wound, and over this strips of adhesive plaster. Linen cloths are to be laid over these, and kept constantly wet with the liq. plumb. acet., and spirit vini; a splint is to be placed behind the joint, to secure perfect rest. In cases where the constitution is debilitated, the adhesive inflammation is sometimes so deficient, that immense abscesses are formed from their not being bounded by adhesion; and I recollect having seen in a poor hypochondriac the back nearly covered by an abscess to which adhesion had not formed bounds.

Hare lip

In the operation for hare-lip, it is by the adhesive inflammation the wound becomes united, and the deformity removed.

The effusion of adhesive matter, by unloading the vessels of the part, has the effect of reducing the inflammation, so that the process generally terminates as soon as this effect is produced, and this has led to the application of this principle for the reparation or restoration of some portions which have been destroyed by disease, or designedly mutilated. In the East Indies, where it is the practice of many of the chiefs to cut off the noses of many of their prisoners, an operation is frequently, and in most cases, successfully, performed, to make a new nose. Many curious cases of this kind are on record.

LECTURE VIII.

ON SUPPURATION.

SUPPURATION is the formation of purulent matter from the secreting orifices of the blood-vessels, which matter is named pus. Definition.

It is formed in cavities produced in the body by a process of absorption, as in abscesses; it is found also as a secreted fluid on the surfaces of membranes, or upon granulating surfaces.

The formation of matter is often attended with severe constitutional irritation; there are rigors succeeded by heat. When, therefore, you see a person who has had severe inflammation, and you wish to know if suppuration has taken place, you ask him if he has had a cold shivering; for this is generally the forerunner of the purulent secretion. If the inflammation be extensive, or seated in any vital organ, the constitutional disturbance will be very great, and the shivering, which indicates the formation of matter, will be very severe, and followed by a powerful re-action. Whilst the rigor continues, the blood collects about the larger vessels in the neighbourhood of the heart, and in the heart itself; at length this organ becomes stimulated to action, and sends the blood with considerable force to all parts of the body, but more particularly to that part where pus is about to be secreted. A rigor, therefore, is Constitutional symptoms of suppuration.

merely a constitutional effort towards accomplishing the object that nature has in view. When pus is easily produced, as upon mucous surfaces, there is no rigor whatever.

Local symptoms of suppuration.

When there is an attempt to produce matter, there is an unusual sensation of uneasiness in the part, together with a blush on the skin, easily recognized, by those acquainted with the subject, as a sure indication that pus either has, or is about to be formed. In the adhesive inflammation, the pain is an acute thrilling one; but here it is more dull, and is likewise pulsatory or throbbing. As this continues, the tumour becomes soft in the middle, but remains hard at the sides; the centre of the swelling points, as it is termed; and, upon pressing the part at this period, fluctuation will be evident.

The next thing to be observed, is an effusion of serum beneath the cuticle, which separates it from the cutis; it becomes gradually distended, and then bursts, leaving the cutis exposed. Ulceration sometimes takes place on the surface of the skin, whilst the same process is going on internally, so as to facilitate the discharge of the matter; generally speaking, however, the ulcerative process is continued entirely from within.

Time required

These are the common appearances produced by the process of suppurative inflammation. Pus is generally formed in from seven to fourteen days; but the time required for this process will very much depend on the constitution of the patient, and the structure of the part in which the inflammation is seated.

Parts prone to suppuration.

Some parts more readily run into the adhesive, others into the suppurative inflammation; the pleura, pericardium, peritoneum, &c., are subject to the former; while the urethra, vagina, lachrymal duct, trachea, bronchi, nasal passages, &c., are liable to the latter: serous surfaces, therefore, are affected by the adhesive inflammation, and mucous surfaces by the suppurative. The reason why the inflammation affecting the two structures produces different results, appears to be this: the vessels of serous surfaces are too small to permit the transmission of the particles which pus contains: but when the inflammation becomes violent or long continued, then

the vessels dilate, and purulent matter is formed, even on serous surfaces. Some experiments have been made, which tend to prove that this theory is correct; for it has been found that injections which are sufficiently fine to pass freely into the vessels of mucous surfaces, will not penetrate in the slightest degree into the vessels of serous surfaces. I shall presently explain this to you more particularly.

In one of the preceding lectures, it was mentioned, that dangerous consequences sometimes arose from passing bougies in very irritable habits; the danger in these cases depends upon the formation of the adhesive inflammation, instead of the suppurative. The duct or canal leading from the inner angle of the eye, and which conveys the tears into the nose, is mucous, and, therefore, when inflamed, usually suppurates; consequently it is only obstructed for a short period; and even this obstruction can be relieved at intervals, by pressing the finger upon the skin immediately under the corner of the eye, by the side of the nose, by which means the collected matter will be forced out at the puncta situated in under the eyelid. Should the inflammation, however, be of the adhesive kind, then an obstruction will be formed, that can only be relieved by an operation. This complaint is named fistula lachrymalis. The tears now pass over the cheek, and not into the nose, because adhesive matter has glued the sides of the tube together. The operation for the cure of this is simple, and will be explained to you hereafter. Lachrymal duct.

The membrane covering the internal surface of the trachea is mucous; and, therefore, when inflamed, usually suppurates; but in croup, large quantities of adhesive matter are thrown out, so as very frequently to occasion death. The coagulable matter adheres so firmly, that it cannot be disengaged by the ordinary efforts of expectoration; at last, from its increase, it fills the trachea, and suffocation is of course the result. Nature has, as we before remarked, wisely ordained, that the various outlets of the body should commonly be liable to the suppurative inflammation; and if this were not the case, life would be very much shortened indeed. Trachea.

The antrum highmorianum and the frontal sinuses also readily suppurate under inflammation.

Arteries and veins.

Arteries and veins, when inflamed, generally pass in adhesive inflammation. It occasionally happens, howeve their inner coats suppurate: and I have more than once persons die from the irritation thus excited.

Case.

A man in Guy's Hospital had a leg removed, for a very un ulcer. In a day or two he became delirious, and shortly aft When examined, no particular disease in his body was foun the suppurative process had been set up in the arteries, a caused the fatal catastrophe. Similar events would follo operations for aneurism, if the adhesive inflammation did not vene, instead of the suppurative; for matter would form abo ligature, and, mixing with the blood, would destroy life. purative inflammation of the veins has often been known t on after bleeding, and occasion death. Upon dissection, i cases, matter has been found in the heart, mixed with the bl

Joints wounded.

Wounds made into joints are always dangerous; been said to arise from the admission of air. No nam given to such a declaration but ignorant nonsense; for no power whatever of producing inflammation in these and he who says otherwise, knows nothing about it; the membrane lining joints is a mucous membrane, and, th quickly passes into the suppurative inflammation, which circumstance renders an injury done to these parts exceedingly difficult to cure; besides, the internal surfaces of joints are much more extensive than you would imagine: you would be astonished, if if you saw the internal surface of the knee-joint spread out on this table. Joints are also composed of materials having in themselves very little restorative power, being formed of ligament, cartilage, and bone, parts that soon inflame, suppurate, and become absorbed. Whenever, therefore, you are called to accidents of joints, and where openings have been made into them, these you should endeavour to close as speedily as possible. Likewise, when you have to remove from these cavities extraneous bodies, you should

draw the skin forcibly on one side, and then cut through it down upon the substance. If the operation be performed in this manner, the skin being left to itself will return to its natural situation; consequently the cut in the integuments and that in the capsular ligament will not be opposite each other, and union by the first intention will be much more likely to ensue.

Wounds of the thecæ.

In the treatment of wounds of the thecæ as much caution is necessary as in those of the joints—their structure, in fact, nearly resembles the capsular ligament and synovial membrane: an injury here, causes, in a very short time, great pain and inflammation, and much constitutional irritation and fever. If matter form, it becomes deposited, or locked up, as it were, in a tendinous bag; and so great is the irritation which it sometimes occasions, that it has been known to destroy life in sixty hours.

Case.

A young gentleman from the West Indies, of great professional merit, of the name of Alcock, informed me one Monday night, after a surgical lecture, that he had, in the course of that day, punctured the theca in some part of his hand—as he was living at the time in the house of the late Dr. Haighton, I advised him to show it to the Doctor (who was an exceedingly clever man); he did so;—on the following day he suffered greatly from constitutional irritation, and on the Wednesday morning died: his system was certainly a very irritable one, and that accounts, in a great measure, for so speedy a dissolution. When, therefore, you suspect matter to have formed in these parts, let the quantity be ever so small, you ought to discharge it. It is surrounded by a structure through which, without assistance, it cannot pass; therefore nature requires your assistance. At the commencement of inflammation in these injuries, your treatment should be prompt—apply leeches and lotions, and give your patient calomel and opium—these measures, judiciously used, will often check the progress of the disease, and in a short time completely remove it.

Formation of pus.

Formerly it was the opinion that matter was produced by a dissolution of the solids; but this opinion is now exploded, for we have numerous facts to prove that it is not true; in the urethra, for

example, you all know that matter will be formed on its surface, for months; and is the urethra destroyed by it? No, but, on the contrary, is thicker than it was before the discharge existed; and, upon examination of this part after death, no ulcers have been discovered, even if the matter had been flowing for months: the ancients thought that gonorrhœa arose from ulceration of the urethra; this opinion, therefore, is also found to be wrong. Again, in large cavities, such as the chest and abdomen, an immense quantity of matter may be secreted, and yet, after death, no erosion of the solids will be discoverable; but the membranes lining their cavities, namely the pleura and peritoneum, will be found very materially thickened. I remember, when there was a very warm discussion on this subject; the disputants used to put pieces of raw meat upon the surfaces of ulcers, and after suffering them to remain for some time, would then carefully weigh them for the purpose of ascertaining the quantity of substance lost.

Experiment.

Pus, then, seems to possess no chemical quality by which it can act upon dead, much less can we conceive its power of dissolving living solids. Bones will remain for months and even years in pus without solution, and tendons continue in it for several weeks, and at last separate by sloughing. Experiments were made in this Hospital, whilst I was apprentice here, to ascertain if portions of meat would be dissolved in pus; but no diminution of their weight was found until the process of putrefaction commenced; it follows then, as milk, bile, saliva, or tears, are produced from the blood by the action of the blood vessels, so is pus but an altered state of the blood, produced by the extremities of the secreting vessels upon the natural surface, or upon the granulations of an ulcer.

Pus secreted from the blood

Pus is not a fluid produced by the dissolution of the solids; it is secreted from the blood-vessels, but not until they have been acted upon by inflammation. The effects produced by the application of a blister exemplify this; when the cuticle is raised, first serum and fibrin are thrown out; remove the cuticle and apply upon the raw skin a piece of glass; at first no matter is to be seen, but in a few minutes you will observe it collect and adhere to the under side of

the glass; bile, urine, and in fact, all the fluids, are secreted from the blood, but in each instance the action of the vessels is different.

Pus is composed of serum, and particles swimming in that serum; there may be, also, a little coagulable matter in the serum: this, however, is hypothesis; that fibrin is poured out from the vessels in adhesive inflammation is not hypothesis, but, on the contrary, a well-ascertained fact. The globules of pus are the same as the globules of the blood, but the action of the vessels appears to take away their colour; their form is the same; size the same; these globules also resemble those that are contained in mucus. Composition of pus.

Pus, when healthy, is a bland fluid, and will not irritate the parts that produce it. If poured into water, it sinks, because its specific gravity is greater than that of water. It appears to be composed of constituent parts of the blood, slightly changed in their character by inflammation. Healthy pus, I say, does not irritate parts; but surgeons formerly thought otherwise, and therefore used to cover the surfaces of wounds with sponge, for the purpose of sucking up the matter as fast as it was generated. When, however, pus is unhealthy, having mixed with it too large a portion of serum, or when bloody, then in passing over the skin it will irritate and occasion excoriation. Healthy pus

This matter does not appear prone to putrefaction, in the healthy constitution, but in some persons it will, in a very short time, become inconceivably putrid and fetid.

A butcher, when getting out of a hay-loft, missed his footing, and in trying to save himself from a fall, had the misfortune to hitch his hand upon a hook, upon which the poor fellow hung like one of his own sheep. Eight days after the accident, he was brought to Guy's Hospital; the next day his hand was opened, and the matter discharged was most horribly offensive; on the following day he died. Whenever the matter of an abscess becomes offensive, you should regard it as a bad symptom;—such cases are troublesome, and often terminate fatally. Thus matter will be rendered offensive by local circumstances, as by a diseased bone. Case.

For example, in diseases of the bones of the nose, the smell is more offensive to my olfactory nerves than any thing I know in nature.

Pus of a poisonous nature.

When matter of a poisonous kind, the result of a specific inflammation, is applied to the surface of the body, it irritates, occasions inflammation and suppuration, and this newly-formed matter is of exactly the same description as that which produced it; at least the poisonous quality is retained undiminished in virulence. This is illustrated by the discharge of gonorrhœa, chancre, small-pox,&c. To enumerate all the instances would fatigue you.

But these instances must be considered as additional arguments in favour of pus being a secretion.

Suppuration is not without its advantages; in two points of view it is very important.

Utility of pus

First. By forming a covering to granulating surfaces, thereby preventing the granulations from becoming dry through the influence of the air; for, if they were not kept moist they could not push forward. Secondly. The suppurative process is the means resorted to by nature for effecting the escape of extraneous bodies: thus a ball, by its pressure, gives rise to suppuration, and ultimately is discharged, excepting in such cases as we have before described, where it remains encased by adhesive matter. Another advantage possessed by pus, will lead to the healing of a sore without any adventitious aid. Thus we see in other animals, sores encrusted with the solid matter of pus left by evaporation: under this is fluid pus contained, and when the encrustation is removed, healthy granulations appear. In sores obstinately resisting different applications, I have seen them thus encrusted when left without applications of any kind, and heal gradually without further attention.

Some wounds are very troublesome, and, do what we will, we cannot get them to heal. Now and then it happens, if you discontinue your dressings to such sores, and let their surfaces remain exposed to the air, incrustations or scabs will form; under these, pus will be secreted, which, by keeping the granulations constantly

moist, will often cause ulcers of this description to heal, when all artificial attempts have been completely unsuccessful.

When the constitution has been long accustomed to a discharge from an ulcer, some caution is requisite when healing it: nature appears to produce a quantity of blood equal to the discharge which those sores have supported, and to continue to do so after it has ceased, for, if done too suddenly, hectic or apoplectic symptoms are very apt to supervene. This may be prevented by great attention to the secretions, by giving frequently calomel at night, and an aperient in the morning: or by taking away occasionally some blood, when the above symptoms supervene. Ancient surgeons observed these; to obviate which they were in the habit of making issues in other parts of the body at the time of healing old sores. Quantities of matter, constantly discharging for a considerable period, inevitably act on the constitution as sources of depletion; and which, if suddenly discontinued, we may reasonably imagine would produce the symptoms before stated. There is no necessity, however, for issues to prevent them, as purgative medicines will answer much better, and speedily carry from the system, by a natural channel, any increase of its fluids. Mr. Wilson, formerly a lecturer on anatomy in this town, in his younger days was for a long while annoyed by a spitting of blood, which threatened him with an attack of pulmonary consumption; at length an ulcer formed upon his arm, and shortly after the bleeding from the lungs ceased. The sore was an exceedingly obstinate one, and resisted for a great length of time all attempts that were made to close it; at last, however, it was accomplished, upon which the bleeding from the lungs once more returned.

Caution in stopping long continued discharges.

A long-continued discharge from the ear has, upon being too suddenly checked, produced oppression of the brain.

Suppuration is best promoted by the application of heat and moisture; but we shall treat of this subject more particularly when we describe abscesses.

LECTURE IX.

ON ULCERATION.

Definition.

ULCERATION is the absorption of any constituent part of the body. I have already endeavoured to explain to you, that under the increased action of the vessels which accompanies inflammation, an increased deposit takes place from the arteries; also, that this deposit is according to the stage of the inflammation, and the part which the inflammation attacks; that the inflammation is either adhesive or suppurative, and that it ends in the one state in the immediate production of the process of adhesion, and in the other in the effusion of a quantity of purulent matter from the extremities of the vessels.

Effects of inflammation on the blood-vessels.

Effects on the absorbents.

But inflammation has not only an influence on the arteries; it has also an effect on the absorbent vessels, which are thrown into a state of inordinate action, whenever any considerable quantity of blood is thrown upon them. There is a natural balance between the action of the arteries and the absorbent vessels. In a state of health, and at the adult period of life, the portion of matter deposited by the arteries, and the portion taken into the system by the absorbent vessels, are, as nearly as possible, balanced. In youth a greater quantity is poured out by the arteries than the absorbents remove; but in age a smaller quantity is deposited than absorption is taking away. You find, therefore, that the balance is destroyed in a different manner at different periods of life; but when a considerable and inordinate absorption takes place of some part of the body, that absorption is denominated ulceration.

Ancient hypothesis.

It was formerly thought, that it was necessary to the ulcerative process, that matter should be formed; but this is not the case, as ulceration often occurs without being accompanied by any purulent secretion. The formation of matter, therefore, is not necessary to the process of ulceration. The great cause of ulceration is *inflammation united with pressure*. If the inflammation be considerable,

and the pressure but slight, ulceration will be produced; and if the pressure be very considerable, and the inflammation but slight, still there will be ulceration. As a proof, both that pressure is the cause of ulceration, and that ulceration is not necessarily accompanied with the formation of matter, I will give you the example of aneurism. Here is a specimen on the table of a large aneurism of the aorta, just above the heart, into which you may pass your hand in the hole produced by the ulceration of part of the ribs and sternum; those parts having been absorbed by the pressure of the aneurismal sac, producing an increased action of the absorbent vessels. Here the pressure is exceedingly great; but the degree of inflammation is very slight. In the same manner we see an aneurism of the aorta on the fore part of the spine, producing absorption of the vertebræ, by the pressure of the aneurismal bag, though no matter is effused, the ulceration being produced by the pressure arising from slight inflammation, unaccompanied by any secretion of matter. From these facts, we are led to conclude, that the formation of matter is not necessary to the ulcerative process; and that it only happens on exposed surfaces of the body, where it is necessary for the protection of sores, by covering the granulations.

Causes of ulceration.

Pressure.

Example by pressure.

The constitutional symptoms of ulceration are slight. In general, a degree of fever attends it, but it is very slight. The pulse is under 100, and at the same time small; we do not find any considerable excitement of the constitution, and the fever is rather of the hectic or chronic kind, than sudden or violent in its attack. It continues sometimes for several days. The pain attending ulceration is not very considerable; if you ask the patient, he will tell you that it is of a gnawing kind, as if there were insects about the part. We may conclude, therefore, that the *irritation attending ulceration is but slight, and the pain not considerable.* With respect to the appearance of the ulcerated part, it looks as if it were worm-eaten; the surface is rough, and very irregular.

Symptoms of ulceration.

Sometimes a very considerable portion of the body is removed by ulceration. Here is an example of an ulcerated tibia on the table. See to what an extent ulceration has removed not only the cancel-

Extent of ulceration.

lated structure of the bone, but the shell in which that structure is contained. Here is another example, in which a great part of the tibia has been removed; the ulceration has extended six or seven inches, so that little more than the fibula of the leg remains: such is the power of the absorbent vessels, of feeding, as it were, upon themselves.

Rapidity of its process.

The ulcerative process is sometimes extremely rapid in its progress: as much will be destroyed in the course of a few hours, as will require weeks and months to repair. In proportion to the extent of surface destroyed, will be the difficulty with which that surface is closed. Something will depend, also, on the form of the ulceration, and the kind of surface exposed: but the general rule is, that the difficulty of the reparative process is proportional to the extent of surface destroyed.

Laws of ulceration.

It is a curious law, with respect to the ulcerative process, that it has a tendency to the nearest external surface of the body. This is a law which is attended with the most salutary effects; for, if it were otherwise, the body would very frequently be destroyed by the ulcerative process. In consequence of this tendency, matter formed at a depth in the body, finds its way through the integuments, instead of proceeding through the more important parts. Many examples may be given of this law. One of the most remarkable is this:—Matter forms not unfrequently behind the sternum close to the pleura and pericardium, which membranes are extremely thin, not so thick as paper. From the proximity of these membranes, it might be expected, that the matter would generally open into the pleura, and, by discharging itself into the cavity of the chest, destroy life. Instead of this, however, the pleura undergoes no other alteration than that of becoming thick; and while it is acquiring this addition of substance, the process of absorption is going on in the inner part of the sternum, an aperture is formed through it, and the matter makes its way through the bone and integuments, rather than through the pleura and pericardium. The same circumstance takes place with respect to the peritoneum. If matter be formed in the abdominal muscles, the peritoneum is very

rarely absorbed to admit the matter into the cavity of the abdomen; but the matter makes its way through the integuments, and finds an outlet on the surface of the body.

So in an abscess of the liver, the matter is discharged, not through the skin, which is a more remote surface, but into the cavity of the intestines, whence it is carried off by stool, or discharged into the stomach, from which it is thrown up by vomiting. These effects are produced in the following manner: the surface of the abscess becoming united with a portion of intestine, or stomach, by the adhesive process, the ulcerative action commences, by which a communication is formed between these surfaces, and the matter is discharged in the manner before mentioned, without danger, or at least with little danger, to life. Ulceration of the liver.

The same thing takes place in absorption of the bones. Thus, in ulceration of the tibia, the matter breaks through the skin, or that surface which is only covered by skin and periosteum. This is a law in part depending on the less vitality and greater irritability of those parts which are nearest the surface of the body. The external parts of the body are the most weakly with respect to circulation, and most readily absorbed. I do not mean to say that they are weakly with respect to quantity of blood, for they possess a considerable share of vascularity; but they are weakly with respect to the living powers. The external parts of the body are more irritable, and more subject to vicissitudes of action from corresponding changes of temperature than other parts of the body. They have less strength of circulation, and, consequently, give way to ulceration more readily than those parts which are more deeply seated, and possess a greater strength of circulation. Another reason is, that the adhesive process goes on glueing the more internal parts, while the external, which are thin and weak, become united to these parts, and in this way form a considerable solid. An instance of this is found in the adhesion of the pleura to a lung, so as to form one structure. It may be considered, then, as a law of the animal economy, that the ulcerative process has a disposition towards the nearest external surface of the body. Ulceration of the bones.

Parts newly formed prone to ulceration.

Those parts of the body which are newly formed, are more liable to be absorbed than those which have long existed. A part covered by a cicatrix proceeds rapidly to ulceration, because it is more weakly constituted than those parts which have existed longer. The irritability of a part is proportional to its weakness; and the parts which are weak and irritable, fall most readily into the ulcerative process. To take a familiar illustration—when a child labours under symptoms of constitutional derangement in cutting a tooth, why do you lance its gums? You cut the gums, not for the purpose of making an immediate passage for the tooth, and procuring immediate relief to the child; but because, when the gum by the adhesive process heals upon the divided part, a cicatrix is produced by this little operation, which is very readily absorbed; and the result is, that when the tooth rises, the child cuts it with much less pain and irritation than it would otherwise have done. If a man have inflammation in his leg, and this falls near a place where ulceration previously existed, the scar produced by the old ulcer gives way much more readily than the original skin. I have observed that, if a patient under gonorrhœa, has had an abscess in the urethra, which will now and then happen in consequence of suppuration of the lacunæ, or if from the same cause he has had an abscess in the scrotum, or on the side of the penis, if he should get a second gonorrhœa, he will be sure to be attacked with a similar abscess. Proceed with as much care as you may—guard against inflammation with all possible caution—and yet, if he has abscess in the first gonorrhœa, it will infallibly return in the same part, if he get a second.

Example.

Lord Anson's voyage.

One of the most remarkable instances of the readiness with which the process of absorption attacks newly-formed parts, may be seen in *Lord Anson's Voyage round the World*—a work which, I doubt not, is generally known to you. It is a most able and entertaining publication; and if any student has not read it, I can strongly recommend it to his perusal: for, while professional knowledge should undoubtedly be the first object of your pursuit, general literature should not be neglected, and is so far from being incompatible with that primary object, that it cannot fail to enlarge your

views, and give efficacy to your professional researches. So intimate is the connexion between every object of useful and scientific inquiry, that there is hardly one branch of knowledge which does not in some measure throw light and illustration upon another. The circumstance which I am about to mention, may illustrate this remark. Lord Anson's book is one of the most valuable works which has appeared on nautical subjects; nor is it without its use as illustrative of a principle in surgery. Lord Anson's expedition to the Pacific Ocean was undertaken with a view of destroying the power of Spain in the New World. As he was obliged to sail sooner than he expected, many of the crew which he took out were invalids, some having cicatrices, and others having previously had fractured bones. In his passage round Cape Horn, he encountered very severe weather; many ships were obliged to return; some were lost, and the crews of those which succeeded in getting at last to the Isle of Juan Fernandez, suffered great hardships. In doubling Cape Horn, the crew suffered severely from attacks of the scurvy; and it was remarked by the clergyman, who was an observing man, though he knew nothing of our profession, that the men who had had ulcers before were invariably attacked with ulceration in the same parts; and that if their bones had been formerly fractured, they became disunited. When the men obtained fresh vegetables, &c. on shore, they recovered their health; their bones united, and their sores healed. There cannot be a better example than this, to show the readiness with which newly-formed parts ulcerate, when compared with the original organs of the body.

This does not surprise us, because we know that scurvy produces the ulcerative process, attacking the gums, causing profuse bleeding, &c.; that the ulcerative process has a stronger disposition towards parts newly formed, and that in this case, therefore, it appeared in parts where ulcers had formerly healed, and in disunited limbs where callus had previously formed.

Extremities prone to ulceration.

The parts more remote from the heart ulcerate more readily than those in the vicinity of the heart. This circumstance led me to say, that when the vital action is feeble, and the power of the cir-

culation diminished, we find a greater disposition to the ulcerative process than otherwise. Thus, for one ulcer in the arm, we find twenty in the lower extremities; and you cannot but have observed, in going round the wards, the great number of sore legs, those opprobia of our hospitals.

Slightly organized parts ulcerate slowly.

In those parts which are endued with little vital power, ulceration takes place very readily; while in those to which the quantity of blood sent is very small, ulceration takes place with difficulty. This is the case with tendons. Tendinous parts possess very little blood; very few arteries or absorbent vessels are distributed to them. Hence the process of absorption goes on with great difficulty, and tendons will slough to a great extent rather than become absorbed. This circumstance must influence our practice. In abscess under the fascia, an incision should be made as soon as possible through the covering, to liberate the confined matter. So in abscess of the finger, when the constitution suffers, because the theca will not give way to the process of ulceration, and the nervous system becomes irritated by the pressure of confined matter, an early incision should be made to liberate the matter, and give relief to the constitution. The same practice should be pursued in abscess of the palm of the hand.

Case.

A gentleman who had formerly received a wound above the zygomatic arch from a ball, called on me, having a swelling on the side of his face. I asked him whether he thought the ball was there? to which he replied, No. Upon cutting down on it, I found that it was the ball by which he had been wounded some years before. It had travelled beneath the zygoma to the middle of the cheek, on the surface of the parotid gland, from whence I removed it; perhaps it was assisted in its course by the action of the temporal muscles.

Use of ulceration.

The ulcerative process is useful to the animal economy, in removing extraneous bodies from the system. Thus, a ball lodged in the body, and a ligature round an artery, are disengaged by the process of ulceration. It is useful also in the exfoliation of portions of bone, in separating parts which would otherwise remain in the

body, perhaps for the remainder of life. In three or four months a considerable portion of exfoliated bone will be separated by the ulcerative process. You will find a case of popliteal aneurism in the other hospital, where the leg has sloughed a little below the calf. Almost the whole of the leg has separated, except the tibia and fibula. A very small portion still remains to separate. By my advice, nothing has been done to the living solids, and the process of nature is left to take its course. You will soon see that the bones themselves will separate by the process of exfoliation, and thus nature will herself perform the operation of amputation without loss of blood, or any danger to life.

ON ABSCESSES.

I shall now proceed to the consideration of abscesses.

Definition.

An abscess is a collection of matter in a cyst, produced by inflammation, without loss of substance. What happens in the formation of abscess is as follows:—First, there is an inflammation of the adhesive kind in the cellular tissue, by which the different cells of the cellular membrane become filled with adhesive matter. A slight ulcerative process takes place, the inflammation still proceeding, and a little cavity is formed by the ulcerative process, a space being left for the effusion of pus, the result of the second stage of inflammation. A drop of matter is secreted into the cavity, and as soon as it is poured out, the pressure on the side occasions an increase of the ulcerative process, which adds to the cavity previously formed. More matter is then produced, and the surrounding solids having a tendency to the ulcerative process, it is accumulated, so as to lead to absorption of the neighbouring parts. In the formation of abscess, the matter does not produce absorption of all the parts around equally, but it excavates chiefly on the side towards the skin, and very little in the opposite direction; a circumstance which led to the reflection, that matter had no power of eroding, as was formerly supposed, when it was thought that matter acted chemically on the solids like an acid, or caustic alkali.

Formation of abscess.

Abscesses are dangerous according to the following circumstances :—

Danger of abscesses

First, from their size. It is not, however, the quantity of matter produced which renders them dangerous, but the difficulty which nature has in repairing the devastation made by excavation of the solids, from the pressure of the matter.

An abscess may discharge a great quantity of matter, and the constitution may have been scarcely affected by it; but very soon after it is opened, the constitution begins to suffer. It is not, therefore, the quantity of matter, but the process of restoration after the evacuation of the matter, which affects the constitution. The largest abscesses which occur in the body are those of the liver. Patients will sometimes recover from abscesses of this part, in which immense quantities of matter have formed. I remember one of enormous magnitude, from which the patient recovered.

Case.

Dr. Saunders, the lecturer on medicine at Guy's, asked me to see a woman who had a large abscess in the side. I made an opening into it with a lancet, and it discharged a surprising quantity of matter, as much as would fill two-thirds of a wash-hand basin. I have heard, indeed, of much larger quantities of matter having been discharged. After pressing out the matter, I passed a roller tightly round the abdomen, and brought the parts together, with a view of producing the adhesive process, which now and then occurs. I did not see the patient again, but some days after I met Dr. Saunders, who asked me how I thought the patient was going on. I told him I imagined he asked me, because he thought me very sanguine; and he replied, that I should be gratified to learn, that the woman was doing extremely well. In fact, the orifice had closed; no more matter was discharged, and the patient got well without any bad symptoms. I have mentioned this case, because it may guide your practice when you are operating upon large abscesses, and show you the propriety of endeavouring to procure the adhesive process, by bringing the sides of the abscess together. Very large abscesses sometimes terminate favourably, but in a great number of cases they destroy life.

The next circumstance which renders abscesses dangerous, is their number. Thus, the greater number of little abscesses on the surface of the body, in small pox, frequently destroy life. Here nature performs the suppurative process; the pustules die away, and the cuticle is separated from the surface of the body; but nature has not the power, in many cases, of repairing the destruction of the cutis; the exposure of the nerves of the skin occasions great constitutional irritation, and the patient dies, as if destroyed by a burn or a scald. From their number.

Abscesses are also dangerous, from their being situated in vitally important parts, such as the brain, heart, or lungs; or when they are not seated in parts of vital importance, from their pressure on essential organs. From their situation.

A woman was admitted into this hospital for a complaint in the throat, occasioned by swallowing a pointed bone. All she complained of, at first, was a soreness in the throat; but she was shortly after seized with difficulty of breathing, which increased greatly, and she died. On examination after death, I found, upon making an incision into the pharynx, that between it and the fore-part of the vertebræ, a large abscess had formed, which, by pressing the pharynx forward on the epiglottis and glottis, occasioned difficulty of breathing, and in the end destruction of life. Shortly after this, Dr. Babington came to this hospital with a friend of his, who was labouring under a great difficulty of breathing. He requested me to examine his throat; having put my finger on the back of the pharynx, and felt fluctuation there, I told him that this was a case of which I had seen an instance, where the patient had died from a collection of matter formed in the same situation. I immediately procured a seton needle, and including it in a canula, like a trocar, I put it down into the pharynx, let out a considerable quantity of matter, and the patient was relieved. Here was a case, which, but for this operation, would probably have terminated fatally, by the pressure of the matter on vitally important parts. In the same manner, abscesses in the perineum, or between the prostate gland and the rectum, will, by their pressure on the urethra, Case.

occasion irritation of that part, and sometimes complete retention of urine. Thus, we find, that abscesses, though situated in parts not of themselves vitally important, sometimes become dangerous by their pressure on more important parts.

Recapitulation.

The danger attending the formation of abscesses, arises from their size, number, and seat, or from their pressure on important parts: there is also another danger, if abscesses occur between the bones and periosteum. Whenever bones form the boundary of abscesses, such abscesses are tedious in their cure, and, in many cases, dangerous. Thus, it is in psoas abscess: in this disease the matter begins to collect on the fore-part of the vertebræ, and proceeds through the psoas muscle, till it reaches the groin, where it makes its appearance just below Poupart's ligament; and from examination of these cases after death, the vertebræ are found ulcerated. It is not my intention now to enter into the consideration of psoas, or lumbar abscesses, as they will be treated of on another occasion; but I just mention the complaint, to show the danger of abscesses between the bones and their coverings; and that the reason is, the union between the soft parts and bone is with difficulty produced, and the process of restoration extremely tedious.

LECTURE X.

ACUTE AND CHRONIC ABSCESS.

At the conclusion of our last lecture, gentlemen, we stated that the danger attending the formation of abscesses arose from their size, number, and pressure on important parts; and lastly, that when they formed in important parts themselves, they generally proved destructive to life.

Now abscesses are either acute or chronic.

Acute abscess.

The common course an acute abscess takes is three weeks. The

adhesive inflammation first begins; this is succeeded by the suppurative: and, lastly, the ulcerative process comes on; and it is generally three weeks from its commencement before matter is discharged.

But chronic abscesses are slower in their march; take, for instance, the psoas abscess, to which we have alluded; it is often six months before matter makes its appearance in that complaint. If a person comes to you with a psoas abscess, and you ask how long he has had pains in his loins, he will tell you for four, five, or six months past; seldom less than four, and generally for the space of six months. There are varieties in the irritability of different constitutions, but if you see a man with swelling in the groin, which, when he coughs, rebounds under your hand, and has a fluctuating feel, and who has had for four or five months pains in his loins, you will say that it is psoas abscess; so these are the criteria by which you are to know it. Chronic abscesses sometimes occur in the female breast. Chronic abscess.

A lady was sent to me from Sussex some years ago, to have her breast removed: knowing the surgeon who had recommended this person to me to be an intelligent man, I did not attentively examine the breast, but said to the lady, I will call on you soon, and perform the operation. I fixed the day, and was about to perform the operation, the patient being seated in a chair before me; when I said to the gentleman (Mr. Edwards) who was assisting me, I think that I feel a sense of fluctuation here, at least, I will not proceed to remove the breast, till I have ascertained whether it be matter. I took a lancet, and made an opening into it, and out gushed a quantity of matter. Thus, a chronic abscess had existed in this part for a considerable time. Very lately, while going round Guy's Hospital, one of the young gentlemen, or I believe, Mr. Key, brought me a woman who had a chronic tumour of the breast. On examining it, I perceived a slight fluctuation, and stated, that most probably it contained matter, but was told, in reply to this observation, that it had existed for four or five months; I said, however, it did not signify—asked for a lancet—made a puncture Case.

into it, which let out a quantity of matter; and went away smiling. I merely mention to you these cases, to put you on your guard: for I have seen breasts removed, which were only chronic abscesses; and thus, from an ignorance of this circumstance, you might put your patient to a cruel operation, where a small incision would have done.

nent of ses.

In the treatment of acute abscesses, the best medicine you can give is the liquor ammoniæ acetatis, sulphate of magnesia, and opium; six oz. of the first, one oz. of the second, and a drachm of the tincture of opium, of which the dose is three or four table-spoonfuls three times a-day. By this medicine you lessen irritation, and expedite the suppurative and ulcerative processes: no medicine that I have observed, under such circumstances, gives so much relief. The sulphate of magnesia prevents any costiveness from the opium, and the opium tranquillizes the nervous system, and lessens pain. The local treatment consists in the application of fomentations and poultices: and why, you may ask, use both these remedies? To promote heat and moisture: a less quantity of blood is sent to the part, and a relaxation of the vessels takes place; this expedites the suppurative process, and that being done, the ulcerative process takes place with more ease. The kind of poultice to be applied to the part is of little importance; linseed-meal and water, bread and water, &c. No stimulating action would do; the object is to preserve the heat and moisture of the part, and to prevent evaporation: let the part be enveloped in oil-silk, for, by its assistance, the heat of a part is preserved, and evaporation prevented. It is desirable in the suppurative process to prevent evaporation; oil-silk is what is generally used then in private practice; it is clean, agreeable to the patient, and most conducive to his comfort.

of open-sses.

Before proceeding to the consideration of chronic abscesses, I will say a few words on the opening of abscesses. If an acute abscess seems disposed to go through its different stages without any interruption, the best practice is to leave it undisturbed. Acute abscesses, beginning under apparent tension, ought to be opened as early as possible; the earlier the better. The moment one drop

of matter may be felt to fluctuate, it is advisable to make a free opening, both as it regards the constitution and the part. Whenever the matter can be felt close to bone, it will be right to open it, excepting in cases where it may occur from severe courses of mercury, between the cranium and pericranium. Mercury will inflame the periosteum (and the pericranium is a part of the periosteum) to a greater degree than the venereal disease itself; and in those cases where a fluid exists between the pericranium and bone, unattended with any blush, do not open it; it will be removed by purging, and giving bountifully the decoction of sarsaparilla. But when matter is formed, and there is a blush, it will not be absorbed; an opening must be made, exfoliation will often take place; but when there is no blush, beware of opening the tumour.

Treatment of chronic abscesses.

Now, gentlemen, the treatment of chronic abscesses will be very different from those of the acute kind. In the last case, you wish to diminish the state of excitement in the constitution; and in the former you do all you can to give it additional powers, by allowing generous diet, and giving the patient ammonia and bark; the ammonia is the medicine on which the principal reliance is to be placed. You know that of late, bark has not been much used; but people are apt to run into extremes—bark assists the suppurative process; generous diet must be allowed, in order to increase the action of the parts, by giving tone to the constitution. Stimulant poultices should be applied to the part, and the best I know is the muriate of soda (common salt) and water, a meat-spoonful of the salt to a pint of water, and the poultice should be wetted with this; yeast and oatmeal, vinegar and flour, each of these expedite the process of suppuration. In indolent cases, it is customary to employ stimulant plasters, and the best I know is the empl. galb. comp.; it is stimulating, and consequently excites the action of the part. The emplast. ammon. cum hydrarg., and the emplast. thuris comp. are also used; they, however, are more tranquillizing, and, in general, excite slight perspiration over the part, similar in its operation to the soap cerate, which is also of use.

Opening of chronic abscesses under the fascia lata.

These, then, gentlemen, are the remedies, local and constitu-

tional, to be used in chronic abscesses: but it remains now to be considered how to treat chronic abscesses, when it becomes necessary to open them: I shall now proceed to tell you. Suppose you are called to a case where there is a collection of matter under the fascia lata of the thigh (the largest in the body), extending, as it often does, from just above the knee to the trochanter major? what would you do? Open it certainly; make an incision half an inch in length, and squeeze out all the matter you can. Having done this, apply a roller, making the turns all over the thigh, with the exception of the opening; the result of this is, in many instances, that adhesive inflammation is excited, and thus the sides of the cavities are often readily united; always take care, in the application of the pressure, to leave the mouth of the wound uncovered. The same directions are to be attended to in collections of matter, when met with under the tendinous expansion which covers the muscles of the leg and fore-arm; the object is to endeavour to produce the adhesive inflammation, just as in the case of abscess in the liver, that I stated to you on the last evening; from which the matter was evacuated by the puncture of a lancet; and afterwards by means of pressure, the adhesive inflammation, took place, and the recovery of the patient was the consequence. This, then, is to be your practice, to endeavour to procure a union of the sides of the cavities by the adhesive process.

Prevention of scars.

Another reason for the early discharge of matter is the prevention of scars, particularly in exposed parts of the body. This may appear to you of little consequence, but I tell you it is not so: scars, from abscesses in the neck of females, excite in the minds of most of our sex a reluctance to associate with them; and thus many a fine young girl may, from these blotches and scars, be doomed to perpetual celibacy. No part of the practice of surgery has been so bad as the manner in which wounds on the neck have been treated. I have seen on one side of the neck large scars from old wounds that had been badly managed; whilst, on the other side, where the treatment had been more skilful, scarcely any vestige of a wound was to be seen. I have, from very early in life

(and subsequent experience has proved to me its use), been exceedingly careful in the management of these cases. Aperients, with calomel and rhubarb, should be given; evaporating lotions should be used. You must be strict as to diet and regimen; for though the patient be debilitated, he must be made still weaker. The best mode to adopt in these cases, is to open the tumours before the skin is much affected, and before a blush has appeared, and scars will in general be prevented. It is desirable in opening the tumours, to use a very fine knife, for two reasons:—1. A small opening is made; 2. It does not alarm the person. The knife I always use, is the one contained in the eye-case, for cutting up the cataract, the blade one-eighth of an inch wide, and it appears to the patient as a needle. When you press the sides of the wound, take care to squeeze out all the solid flakes of matter to be met with in scrofulous tumours. If this be not attended to, they will at last slough; but if, on the contrary, you carefully avoid leaving any of that unorganized substance, adhesion will take place, and the wound heal up. Every thing in these cases depends on getting rid of the solid matter. Bread poultices, wetted with a sulphate of zinc lotion and spirits of wine, may be used afterwards.

Whilst living in Broad-street, in the city, a lady came to me with a tumour in the side of the neck. I perceived on the opposite side several scars; I said "Will you allow me to try if I can prevent a scar here?" She answered, it was for that purpose she had consulted me. Warm poultices had been used on the previous occasions, with which I would have nothing to do in this, and she got well with scarcely a pimple to be seen. It is of the highest importance, then, to endeavour to prevent those appearances, which, on the exposed parts of the body, produce such painful feelings. In the higher orders of life, particularly, a child with scars and blotches on its neck would be secluded from society. Case.

Now, gentlemen, there is a point of great importance to be attended to, *viz.* the direction in which you make the opening: always make it transversely, and not in the axis of the neck; for when the wound heals, it will scarcely be seen among the creases Opening scrofulous abscesses.

or folds of the neck. One more observation on this subject: let me entreat you not to open these tumours when they have a blush on them like the hue of a grape; the veins are in a dilated state, and if you open the tumour, you will bring discredit on yourself. If the edges of the wound should not unite in any part, a little injection of sulphate of zinc or copper may be used.

There are two other points connected with this subject, which I will mention to you, and then I shall have done.

Causes of hectic fever.

1. The causes of hectic fever. You are all aware that a continued fever, *i. e.* rigors followed by heat, and a sweating stage, attend the formation of matter: these rigors take place once or twice in twenty-four hours, according to the irritability of the part and constitution; and had it been asked, thirty or forty years ago, on what it depended, it would have been said, absorption of matter into the constitution. Some of the old surgeons used to put sponge to the mouth of wounds, to absorb the matter, and prevent its being carried into the constitution; but, gentlemen, it appears to have no power on the constitution. There is no doubt, certainly, that the inoculation of putrid matter will, as we often see, sometimes prove fatal. The proofs that the absorption of common matter into the constitution does not produce fever, are—1. It is not during the formation of matter that the fever comes on; for never till after the abscesses have broken is the patient attacked with it. Certainly, the formation of matter will be attended with a slight fever, but not of the hectic kind: the tongue will be clean, the pulse very little affected, and the person very slightly deranged; but after an opening is made into the part, constitutional irritation sometimes comes on, and life is then endangered.

2dly. The degree of hectic fever is not at all proportionate to the size of the surface on which the matter is formed. Look, for instance, at a large wound on the leg: the person will be going about with it, and feel little or no inconvenience; whilst a sore on the lungs of the size of a crown produces hectic fever of the most violent kind. On one part, it is very considerable; on another, it is very slight.

3dly. Hectic fever comes on when no matter has formed. A woman, who had her leg amputated, came into the hospital for a pain in the knee on the same side; the symptoms of constitutional irritation were so severe, that in consequence Mr. Chandler held a consultation. The knee-joint was a little enlarged, and violent pain in the part, with great constitutional disturbance existed. Amputation was now performed above the joint, and after the operation I had an opportunity of examining the limb. There was no formation of matter in the knee; in the condyles, however, of the thigh-bone the ulcerative process had commenced, and the hectic fever was the effect, in this case, not of a disease of the knee-joint, but of the cancellated structure of the thigh-bone. In those cases also where matter has been absorbed, no hectic fever has come on. Some years ago, my old friend, Mr. Cline, thought that psoas abscesses might be cured by causing the absorption of the matter, and he tried the effect of digitalis on a boy of sixteen years old, who had a psoas abscess; the size of the tumour diminished, the skin became flaccid; but as soon as the digitalis was left off, the matter returned again, and during the trial of the medicines, the pulse was lessened, and the boy a little weakened—symptoms which, as you well know, are produced by digitalis. But during this time, no hectic fever came on; therefore, the belief of the absorption of matter being the cause of hectic fever is unfounded; for it is only the result of a constitutional effort to repair an injury, or to cure a disease. Case.

The last circumstance that I shall mention, is the influence which the admission of air into cavities has in producing local irritation. Now, from what I stated concerning the absorption of matter into the constitution, I think you will have agreed with me: whether you have or not I do not care; it is my duty to state to you my opinion—you must think for yourselves; only do not rest contented with thinking; make observations and experiments; for without them your thinking will be of no use. The circumstance, however, about the admission of air into abscesses, when they are opened, not producing local irritation, will be less readily understood. Influence of air when admitted into abscesses.

When an opening is made into an abscess, very little irritation supervenes till the third day; I say the third day, because it is not till then that constitutional disturbance takes place. If asked whether air has any influence in producing local irritation, you may answer, yes; but I say that it is not the case. Old surgeons, in their opinion on this subject, maintained that it was the admission of air which produced the local irritation attending the opening of abscesses, and endeavoured to cure hydrocele by inflating it after the evacuation of the water. But what was the consequence? when the air became absorbed, the adhesive inflammation did not take place, and the hydrocele returned.

Experiment.

Again, experiments have been made on animals: air has been blown into the cellular membrane of a dog; nothing but a temporary stiffness from the distention of the skin takes place, and when the air is absorbed, the crackling goes off without the adhesive inflammation. Dr. Haighton made an ingenious experiment some years ago; he inflated the abdomen of a dog from an opening in the tunica vaginalis; and this mode of doing it evinced his knowledge; for in the dog, and many other animals, there is communication with the abdomen from under the tunica vaginalis. The dog was let loose; he was stiff for a few days, but when the air was absorbed he became quite well.

Device of the Norwich butcher.

I know a curious circumstance which took place at the depôt at Norwich; it was at the time when persons were drawn to serve in the army. A man, unwilling to become a soldier, came to the surgeon, and said that he had a large rupture, which disabled him; he showed it, and the surgeon sent him away. This man had made a puncture in the scrotum, and inflated it with a brass blowpipe; the man himself mentioned it to a surgeon at Yarmouth as a joke.

Cause of irritation

What takes place when air is admitted into the cavity of the chest? An air-cell gives way, the wind goes into the cellular tissue, the face and body become bloated up, but is afterwards removed by absorption, without producing any inflammation; thus a person who holds that the admission of air into cavities produces the

irritation attending the opening of abscesses, takes a narrow and partial view of the case; for the cause of the irritation is as follows: if a wound be made into any cavity of the body, be it an abscess or a natural cavity, soon after the vessels of the part are divided, inflammation arises to heal the wound, whether it be exposed to the air or not. If it heal by adhesion, the influence is slight, and directly terminates; but if the adhesive inflammation be insufficient or imperfect, then a suppurative inflammation follows, and granulations arise, which process produces violent influence both upon the part and constitution. Therefore, the cause is, the division of the blood-vessels, and not the presence of air; and its degree depends upon the ease or difficulty with which the injury is repaired.

[After the lecture, the stomach of a dog which had died of hydrophobia was exhibited to the class. The œsophagus was inflamed, and the internal surface itself very red; there were also deposits of coagulated blood between the mucous and muscular coats, an appearance which, Sir Astley said, had always been observed in dogs that had died of this complaint. The animal had unfortunately bitten four persons, who were under medical treatment.]

LECTURE XI.

ON GRANULATION.

I HAVE endeavoured to describe to you the first mode in which the union of wounds, and the mode of filling up cavities is effected, namely, by the process of adhesion. I shall now proceed to consider the other mode of union between divided parts of the body, namely, *Granulation;* thus the two processes which nature institutes for the purpose of filling up the cavities of the body for the cure of wounds are adhesion and granulation. Two modes of union.

If you are asked for a definition of the term granulation, you will Definition.

say that a granulation is a newly-formed part, generally red in colour, and having the power of secreting pus.

Its formation.

The mode in which granulation is produced is as follows:—and you will find it very similar to adhesion, but differing from that process in one respect.

Process of nature in uniting divided parts.

When an abscess has been opened, or when a wound has been produced, if the abscess be not immediately closed, or if the edges of the wound have not been brought together, inflammation is excited, and this inflammation occasions an effusion of the fibrin of the blood upon the surface of the wound. This fibrin is poured out in a layer which covers the surface of the wound. The layer of fibrin soon becomes vascular, for blood-vessels, which are elongations of the vasa vasorum of the divided vessels, are forced by the action of the heart into the fibrin which has been deposited, and this layer consequently becomes vascular. The difference between the mode of union by adhesion and by granulation, is, that in the latter the vessels shoot to the surface of the layer which has been thrown out, terminating by open mouths on the surface of the newly-formed substance, and secreting pus, at the same time that a layer of lymph, or fibrin, as it is more correctly termed, is effused. The fibrin which is poured out, besides this purulent secretion from the vessels, forms a second layer, into which the vessels shoot as before. The vessels supporting the first layer are the means of supporting the second layer, where the vessels terminate as before, in open mouths on the surface of the substance effused. In this manner layer after layer is formed until the cavity becomes filled.

Characters of granulations.

The characters by which granulations are distinguished are these; their surfaces are uneven: they are generally red in colour, and they secrete matter. I know not whether you have followed me in this, but this process may be easily explained. Suppose we open an abscess, the result is, that adhesive inflammation is produced in the internal surface of the cavity. A layer of adhesive matter is in this way thrown out, and if the sides of the abscess are brought together by passing a roller round it, we may often prevent the future formation of matter, as I have before had occasion to explain to you.

But if the union by adhesion does not take place, then granulations are formed in the following manner:—When fibrin is poured out, the vessels shoot up to its surface, permeate the newly-formed substance, and terminate by open mouths on the surface of the layer. This layer becomes the means of filling up a portion of the cavity; it is soon succeeded by another; the vessels become elongated, effuse matter on the surface, and shoot up as before, to the second layer of fibrin. In this manner one layer after another is formed, until the cavity of the wound is entirely filled. Granulations formed.

The vessels shooting into granulations are very numerous; they are principally arteries. If you inject an ulcer of the leg, the great degree of vascularity in the granulating surfaces is accounted for by the number of vessels divided into radiated branches, which we see entering the granulations, and producing the arborescent appearance which is observed in them. In examining the structure of granulations, they appear to become vascular in the following manner:—An artery enters at the base of the granulation, and is then divided into radiated branches; from these vessels pus is secreted, and an incrustation is formed, producing a layer of adhesive matter on the surface of the granulations. Their vascularity.

This is a little difficult to conceive; it is a circumstance which, I believe, has never been observed, and which I learned in the following manner: I took a portion of injected ulcer from the arm, and threw it into alcohol, in order to observe its vascularity. After it was thrown into the alcohol it was so opaque on the surface that no blood-vessels could be seen. It is the fibrous matter, therefore, covering the surface of the granulations which receives the blood-vessels. In this view a granulation may be considered as a gland, and the surface of an ulcer merely as a glandular surface. Now a gland is a part of the body in which a secretion from the extremities of the arteries takes place, and the blood which is not employed in the secretion is returned to the heart, by means of the veins which accompany the arteries. So in granulations, the arteries throw a quantity of blood near the surface of the wound, and there secrete pus. There is a vein accompanying each artery, and the Experiment.

fluid conveyed by the vessels is partly converted into pus on the surface of the ulcer, and partly returned back to the heart.

Their powers of absorption.

Granulations are not good absorbent surfaces in ulcers recently formed; but if the ulcers have existed for any length of time, the absorbent vessels readily take into the system any substance which may be applied to them. In this way we frequently see persons salivated by the use of injections of the oxymuriate of mercury. It is not an uncommon practice to inject a solution of a grain or two grains of oxymuriate of mercury into sinuses, for the purpose of stimulating the vessels. If the sinus has existed for a considerable time, the oxymuriate of mercury is frequently absorbed, and the mouth becomes affected in the same manner as if the mercury had been absorbed into the system by rubbing it into the skin, or taking it into the stomach. This proves that old granulating surfaces have the power of taking in, by absorption, a fluid of this description.

Lotio nigra.

I have known what is commonly called the black wash, which is composed of the liquor calcis and the submuriate of mercury, when applied to the surface of ulcers, produce an effect upon the mouths of persons who are easily affected by mercury. I believe that the wash of the liquor calcis and calomel often produces good effects in the cure of sores, by the mercurial action which it excites in the system, and not merely by its local effects on the sore to which it is applied. Ulcers are, however, frequently the means of producing baneful effects upon the constitution, by the readiness with which they absorb any substances which are applied to them.

Liquor arsenicalis.

Thus, arsenic applied to the surfaces of sores is very frequently absorbed into the system; and on this account, arsenic is to be regarded as a very dangerous external remedy. With respect to the use of arsenic as an internal remedy, it ought never to be employed without extreme caution, and unless the patient is watched from day to day.

Case of death from arsenic

I remember a case in the other hospital, of a patient who was brought in with a fungus of the eye, and who was under the care of Mr. Lucas, a man of great skill in his profession, and the father

of the present surgeon of that name. Mr. Lucas ordered a solution of arsenic to be applied to the part. After it had been used for three days, the man complained of pain in the stomach, but this was not supposed to arise from the use of the solution. The application was continued; the pain in the stomach became excessive; convulsive tremors of the muscles succeeded, and the patient died. I was quite sure that he died from the influence of arsenic in the system; and upon examination of the body after death, I found the stomach inflamed, and exhibiting the peculiar appearance which is produced by arsenic, and not by poisons generally. I believe, therefore, that this person died from the application of the arsenical solution.

Quacks.

Quacks are in the habit of destroying tumours of the breast by the use of arsenic. Women are sometimes, though very rarely, foolish; and they will undergo any torture which is not inflicted by a knife, rather than submit to an operation that would not give them a tenth part of the pain which they suffer from such applications. They go to a person who tells them of the number of cures he has performed by means of a specific used for the purpose of destroying scirrhous affections; and, indeed, these quacks very frequently destroy the scirrhous part, and the patient too. Mr. Pollard, a surgeon, told me, the other day, of a person in town, who applied an arsenical preparation for a scirrhous affection of the breast, in consequence of which the patient died in less than a week.

Case.

I had myself occasion lately to perform an operation for a scirrhous breast, to which arsenic had been applied. I asked the woman which gave her most pain, the application of the arsenical preparation or the operation. She replied, that the pain of the operation was not so great as that of the application, and that the arsenic had been applied ten or eleven times. The consequence of these applications is, that they become absorbed into the system, and produce derangement of the stomach, the intestinal canal, and the nervous system, and sometimes cause paralysis.

Anecdote of a notorious quack near the Kent Road.

While I am on this subject, I will mention a case to you which

occurred in this town, and which I should have scarcely believed, if it had not come within my own knowledge, that of Sir William Blizard, and other surgeons. A person in this metropolis happened to have *bow* shins. It was a part of his duties to teach ladies to draw and paint, and in the prosecution of this branch of his profession, he found his *bow* shins, as he himself declared to me, a very great evil. He felt that his merits were less fairly appreciated, and his instructions less kindly received, by reason of the convexity of his shins; he was persuaded, in short, that his *bow* shins stood between him and his preferment. Under this impression, he went to a very noted person in this town, and showing him his bone, said to him, "Pray, Sir, do you think you can make my legs straight?" "Sir;" said the doctor, "I think I can: if you will take a lodging in my neighbourhood, I think I can scrape down your shins, and make them as straight as any man's." A lodging was taken; the father of the patient assisted in the operation, and all three of them—the father, the son, and the doctor—took a turn in scraping down the convex shins.

A great deal of rasping was required; an incision of very considerable extent was made in the skin, the integument was turned aside, and an instrument which was at that time contained in the surgeon's case, called a rougee, was employed to scrape the shin-bone. When the doctor was tired of rasping, the father took a spell, and the patient, in his turn, relieved his father. At last the shell of the bone became so thin, that the doctor said they must proceed no further with that leg. The other leg was then rasped in a similar manner, and thus large wounds were produced in both of the shin-bones. The surfaces granulated very kindly, and little exfoliation of the bones took place; but, unluckily, the granulations *would* form bone, so that up jumped the bones of the shin again. The doctor, however, was not to be defeated, and accordingly put a layer of arsenic over the whole surface. It was in consequence of the effects of this application that I saw the patient. The arsenic was absorbed into the system, and he became paralytic in his arms and

lower extremities. A great number of exfoliations took place in his legs; and he showed me a large box, in which the exfoliated portions of bone were contained. I recommended him to go into the country, and he went to Bath, where he staid for some time, and got rid of his paralysis. This case made a good deal of noise in town; and there were some surgeons who expressed a strong wish to prosecute the doctor. I recommended them, however, not to take any steps until I had seen the patient himself: and when he next came to me, I asked him whether he thought his legs improved, and whether he would again undergo the same operation, at a similar hazard of his life, to have his legs made a little straighter? He replied that he would; and under these circumstances I was of opinion that, as the young man was content, it was a folly to think of prosecuting the doctor. The patient, in this case, appeared to be as great a fool as the doctor whom he consulted, and deserved to be punished for his folly. I have no wish to injure individuals; and I shall not, therefore, mention the name of the operator. Some time has elapsed since the case occurred, and the transaction is now almost buried in oblivion. One of the parties is since dead; not the person, however, who underwent the operation, for he still lives, and is proud of his improved legs; and the doctor lives also, and is well known to most of you, at least by name.

Application of opium.

Opium, when applied to the surfaces of sores, is very readily absorbed into the system. I believe that it is often a very useful application to the surfaces of sores. I mentioned, on another occasion, a case in which a tetanic affection was produced in a child, whose leg had been amputated by Mr. Lucas, the present surgeon of Guy's, and where the application of opium to the stump gave more immediate relief than I ever remember to have witnessed. It relieved the spasms, and, as I believe, saved the child. If opium, applied to the surface of sores, be absorbed into the system, it produces excessive costiveness, extreme pain in the head, and torpor of the system, which is only to be removed by the frequent administration of active purgatives. The effects on the constitution,

when absorbed from the surface of sores, are very much the same as when it is introduced into the stomach.*

Sensibility of granulations.

Granulations possess nerves as well as arteries, veins, and absorbent vessels. Granulations are sometimes extremely sensitive; but this is far from being the case in all granulations We shudder at seeing a person handle a sore roughly, supposing that it must give the patient extreme pain. Granulations which spring from parts endued with great sensibility, such as muscles, are indeed extremely sensitive; but many granulations, such, for instance, as arise from bones, have no sensibility whatever. If ulceration be produced to a considerable extent in an exposed bone of the head, a probe may be put into it, while the patient is quite insensible of your touching his head. If you do this in the granulations arising from bones, and ask the patient whether you have touched him, he will say, "No;" but if you apply the probe to the edge, or near the edge of the wound, he will feel it. Granulations, therefore, springing from bone in an uninflamed state of the bone, are not sensitive.

Except in bones

Cancelli of bones sensible.

Granulations, however, which spring from the cancellated structure of the bone, are, sometimes, extremely sensitive. I have, at present, a patient who had a compound fracture of the leg: the fracture was attended with abscess, and a small exfoliation of the bone took place. In this case, when a probe was put down into the cavity, the granulations from the cancellated structure of the bone were extremely sensitive. When the inflammation passes away, the sensibility of the part is diminished. The same thing happens with respect to granulations springing from tendons, (as the tendo achillis, for instance,) which are entirely insensible. So

* A woman applied to me with a boy, about ten years of age, having Tinea Capitis, she requested some active preparation which I did not think proper to trust her with. On the same day she obtained some tobacco liquor, with which she freely washed the child's head: not many hours afterwards I was sent for, when I found the boy in a state of syncope, pulseless, congestion of the brain, in short, dying I employed local depletion and diffusive stimuli, but he sunk eight hours after the first application of the tobacco liquor —L.

granulations arising from fasciæ, and the aponeuroses of muscles are endued with little sensibility. In general, therefore, although granulations springing from parts of great sensibility are sometimes exquisitely sensitive, those arising from parts in a great degree insensible, or entirely so, as tendons, are not sensitive; a circumstance which you cannot at any time go round a large hospital without having an opportunity of witnessing.

Granulations are very readily united to each other. The mode in which union is effected, is, by bringing the edges of the two granulating surfaces together, so as to produce the adhesive process. The surface of the granulations will be covered by adhesive matter, and you have only to apply the two surfaces to each other to produce an union. The knowledge of this principle is very often useful in the practice of surgery. A man has a considerable portion of the scalp raised from the skull, and the pericranium throws out granulations, whilst the raised portion of scalp is also granulating. Instead of waiting for the tedious process of the union of both surfaces, by granulations filling the cavity, you have only to place one portion of the granulations upon the other, bind them well down with adhesive plaster, and they will be sure to inosculate. In this manner, a surface, which it would otherwise have taken a long time to close, will be healed in a few days. Granulations readily unite.

The cavity of the scrotum, after removal of the testicles, is often covered with a great number of granulations, by bringing the surfaces of which together with adhesive plaster, a wound, which would otherwise require weeks in healing, will be healed in a very short time. Advantage of strapping.

It was upon this principle, namely, that of bringing together the granulating surfaces, that Mr. Baynton proceeded with so much success in the treatment of ulcers; so that our hospitals are now much less filled than they formerly were with those opprobria of our art. Baynton's principle.

The next subject to which I shall direct your attention is the closing of sores by cicatrization.

The formation of the new skin with which a sore is covered over, Cicatrization.

is called cicatrization, which is produced in the following manner:—The vessels at the edge of the skin form granulations, and these granulations unite with the granulations of the surface of the sore. The granulations produced from the edge proceed towards the centre, and those on the edge inosculate with those on the surface of the sore, and are united by the adhesive process. The vessels become elongated from the edge of the sore, and proceed in radii from the circumference to the centre. Day after day, an addition is thus made to the cicatrix, until at last the vessels reach the centre from every part of the circumference; when the process of cicatrization is completed.

It may be said by some persons, that this is not the only mode which Nature takes for the formation of new skin, for that it often happens that the process of cicatrization commences from the centre of the sore. If these persons mean to say that insulated portions of the skin are sometimes seen in the centre of a sore, having no communication with its edges, there can be no doubt of the fact.

But how does this happen? It is not that the centre of the sore has the power of forming new skin, but the new skin in the centre is produced in consequence of the whole of the skin not having been ulcerated away, and granulations arising from the part of the skin which was left. This only happens in irregularly formed sores, where the healing process is gone on to the centre, and then the sore has broken out in the circumference. If granulations arise from any portion of skin in the centre, these granulations produce new skin, and an insulated portion of skin is produced, forming a part of the cicatrix, which is not afterwards ulcerated away.

Appearance of a newly formed cicatrix.

When a cicatrix is formed, in the first instance it is extremely vascular; but when it has existed for any length of time, the blood-vessels become contracted, and it is whiter than the original skin. Hence the white appearance of the cicatrices after small-pox; for, although they are more vascular than the original skin, when first formed, in a little time they lose this vascularity, and are endued with less living power than the surrounding parts.

The readiness with which the surface of a sore is covered in by cicatrization, depends very much on its form. A sore of a circular form requires a very considerable time before it will heal; whereas a sore of much greater length, but of less diameter, will heal more quickly. You may always pronounce, therefore, that a round sore will be longer in healing than a longitudinal one, *cætaris paribus*, as for example, in the same patient, where the constitution is the same. The reason is, that the vessels have to elongate much less from the edge to the centre in a longitudinal than in a circular sore. The form, therefore, has an influence on the readiness with which cicatrization takes places. Importance of form.

Sores are very often difficult to heal, from their situation. Thus, if a sore be situated at the back of the leg, there will often be great difficulty in healing it. Indeed, such a sore can only be healed by raising the heel, and so loosening the skin, in order to give it a power of being drawn in, to form a new cicatrix. By this means the vessels are more readily elongated, and continually draw the skin nearer the centre of the sore. It appears, then, that the form and situation of the sore have a very considerable influence on the healing power.* After the cicatrization of an extensive sore, more especially if it has been produced by a burn, the new formed skin contracts, occasioning great deformity; and if near a joint, further mischief ensues from its motions being impeded. Situation.

Here is a model in plaster, on the table, representing the case of a patient who had been severely burnt, and in which extensive deformity had supervened on the cicatrization of the wounds. The chin had become united to the breast, the arms to the sides, and the upper arm to the fore arm. Contraction of cicatrices.

Now, in looking at a case like this, some of you might be induced to exclaim, How abominably inattentive must the medical man have been who had the care of this patient, for all these consequences might have been prevented? If you said this, your

* For this reason, ulcers situated over tendons, or about the ankle, will, for a long time, resist every means of healing them, on account of the granulations being disturbed by the slightest motion of the parts in contact.—L.

censure would be culpable; you have no right to say so; for it is a case that may happen to any of you. Deformities of this kind generally arise after the process of healing is completed; they are the effects of the contraction of the cicatrices, and not of the contraction of the skin at the time of the accident. Here the skin is contracted so as to pull down the chin, and evert the lip, so that the saliva runs over the surface of the breast, and is constantly excoriating it. All these results proceed, not from the production of the new skin, but from the contraction of the cicatrices after the production. I say this from having seen, among many other cases of the kind, the case of a child who was a short time since admitted into Guy's. In consequence of the contraction of the cicatrices, the upper arm adhered to the fore-arm, and the thumb was drawn back so as to be immovably joined to the upper arm.*

Case. I will mention another case of this kind. Some time ago, a young gentleman, who was playing with fireworks, happened to be slightly burnt in the forehead. His father, who was a very intelligent man, showed considerable anxiety, and expressed his apprehensions at the time, that some horrible deformity would arise from this accident; for he had witnessed instances in which the eyebrows

* It would be tantamount to sacrilege in me to detract from those opinions of Sir Astley, founded as they are on the most extensive practice, with a mind peculiarly bent on prying into the secrets of nature, neither is it the vanity of obtruding an isolated hypothesis on the profession, but a sincere desire to benefit suffering humanity, and in some degree to redeem the healing art from such an opprobrium.

That such contractions do take place I am well convinced of; but if the healing process were not accelerated by *astringents* and *escharotics*, and instead of which, warm and moist poultices applied for a length of time, especially where there is a loss of muscular substance, no contraction would take place.

I could enumerate a number of cases in support of this mode of treatment, but the brief space of a note will only permit me to state one.

Case. A young gentleman while lecturing on heat at the Southwark Literary Society, had his hand severely burnt in several places with phosphorus, owing to the high temperature of the room, and being in the vicinity of a large fire. Mr. Pilcher, Lecturer on Anatomy at the Webb Street School, and several other medical gentlemen present, rendered him every

had been drawn up, so that the patient had no power of closing his eyes, from a similar cause. Granulations, however, very soon arose on the surface of the forehead; the sore healed kindly, and the father was delighted to see what he supposed to be the favourable termination of the case. Some time after this, however, I saw this gentleman, and, upon inquiring after the child, he told me that he was very well, but that a horrible deformity had ensued from the accident: the eye-brows were drawn up, the eye-lids elevated, and the forehead was quite wrinkled. This took place a few weeks after the healing of the sore, in consequence of the contraction of the cicatrix; and unfortunately this was a deformity incapable of being remedied by any means which art could suggest. I have never seen a case like that represented in the plaster bust on the table, where the chin is united to the breast, which was capable of being cured. You may, by putting a knife behind the bridle, and dividing it, separate the chin, to a considerable extent, from the breast; but whatever force you may use for keeping the head back, the contraction will ultimately be the same. There are some parts of the body, however, in which deformities of this kind may be removed; as in cases in which the thigh is united to the abdomen, where the bridle may be divided, and the joint afterwards straightened; but where the bridle is broad, as under the chin, no operation will avail.

Parts reproduced.

In the formation of cicatrices the original parts may all be

assistance. Warm poultices were applied until the sloughs came away, then *astringents* and *escharotics*. The granulations proceeded very favourably on every part, except on the ball of the thumb, which evidently evinced a disposition to contract in the direction of the *Opponens Policis*, by forming a rigid cord, which I immediately divided: I re-applied the warm poultices and continued them for about three months; a cicatrix formed, and although there is manifestly a loss of substance, yet no contraction has taken place, and it is now two years ago.

Rationale. Why does nature approximate those distant parts, so contrary to her original design? Because she is propelled by a hurried process of cicatrization to form an unnatural union, before she had time to provide a suitable substitute, which she afterwards resents.—L.

NATURAM EXPELLAS FURCÂ, TAMEN USQUE RECURRET.---Hor.

reproduced, except two. In the first place, new skin, though differing somewhat in texture and smoothness, is still a substance similar to the original skin. Skin may be defined to be a substance producing rete mucosum and cuticle. Are both produced by the newly-formed skin? Undoubtedly. The cuticle is produced very quickly, and with respect to the rete mucosum, or covering matter of the skin, a little time elapses before it is produced; but it is produced, as the following fact will show:—The new skin of a negro does not become white, as in that of Europeans, but is at first red, and after a little time turns blacker than the original skin.

Case of a negro.

I was struck with this in the other hospital, in the case of a negro, who had been a sailor in a privateer, and had received several wounds in different parts of his body. I observed that the cicatrices were every where blacker than the original skin. We may conclude, therefore, that the skin which is reproduced is true skin; that the cuticle is very quickly reproduced, and the rete mucosum after a short period. The cellular membrane is also reproduced, though it has at first the appearance of a solid fibrous mass, which requires some time before it is drawn into the reticular texture, similar to the original membrane. Tendons are very easily reproduced. If the tendo achillis be divided in an animal, it will be reproduced in about a fortnight or three weeks; but it will be somewhat larger than the original tendon. The same thing takes place in the human subject; as you may see from a specimen in our museum of a tendo achillis which had been reproduced, and which is larger than the original tendon. Every body knows that bones are reproduced; not only the shell of the bone, but the cancellated structure; not only the salt or phosphate of lime, but the cartilaginous substance in which it is deposited. Nerves are also reproduced, but there is some little doubt whether they assist at all in the restoration of sensation by anastomosis.

Experiment.

Dr. Haighton made an ingenious experiment with respect to the union of nerves. He divided the par vagum, or eighth pair of nerves, in a dog, on one side, and then let the animal live for some time; he then divided the par vagum on the opposite side, and after

suffering both nerves to unite, he then divided them at the same moment, when the animal died.

In *tic douloureux*, after the operation of dividing the nerve, even when the sensibility of the part to which the nerve was distributed is not entirely restored, and although numbness still remains in the cheek, the painful sensation usually returns. Case of tic douloureux.

An old gentleman, from Bury, in Suffolk, had undergone the operation of the division of the nerve for *tic douloureux* several times. When he came last to me, there was still a little numbness remaining in the lip, yet the pain of the *tic douloureux* was as great as ever. I divided the nerve, but the operation did not afford him the same relief as before. He came again some months after, and wished the nerve to be again divided. The pain in the part had returned to its former degree, although the numbness of the lip was much greater than before. Case.

The parts of the body which are not produced, are—first, muscles, in the case of a man who had a scar on the fore arm, which appeared to have long existed, I found that, instead of muscular fibre under it, a tendinous structure had formed. A muscle, when divided, unites by tendon, and not by muscle. Secondly, the cartilages of the ribs unite by bone, and not by cartilage. [Sir Astley exhibited to the class a specimen of cartilage of the human rib which had been divided, and in which ossific union had taken place.] This, however, will depend, in some measure, on the age of the person; for in very young subjects cartilaginous union will be produced, but in subjects more advanced in years, the cartilages of the ribs invariably unite by bone. Parts not reproduced.

LECTURE XII.

ON ULCERS.

In treating of this subject, I shall first describe the appearance of

ulcers in what may be termed their healthy state, I shall then detail the several circumstances which render their cure difficult, and proceed to point out to you the remedies which are found to be the most efficacious in practice.

Definition.

An ulcer may be defined to be a granulating surface secreting matter. When an ulcer is in a perfectly healthy state, the appearances which it exhibits are as follows:—

Appearance of an healthy ulcer

The granulations are florid; their blood-vessels possess a considerable quantity of arterial blood, and the freedom of circulation produces this florid appearance. The granulations are equal on the surface of the sore, rising a little above the edges; for it is necessary, in order that a sore should heal kindly, that the surface of the ulcer should be a little more elevated than the surrounding skin. The surface of the sore secretes matter which has a milky appearance, or rather the appearance of cream. The edge is whitish in colour, and adapts itself to the surface. In this manner the granulations springing from the surrounding skin are very nicely adapted to the circumference of the sore, so that the granulations of the edge unite with those on the surface. When, therefore, you see the surface of an ulcer red, the granulations equal, the surface rising a little above the edge, the discharge of matter healthy, and the edge of the sore nicely adapted to the surface, you will say that this ulcer is in a healthy state. In order to produce this state of the sore, the best practice which you can generally pursue is to apply poultices and plasters

Principles of treatment

When you open an abscess, or when a wound is produced which cannot be healed by the adhesive process, the best application is a poultice, for the purpose of exciting the growth of granulations. This poultice must not be too warm; it should be gently stimulating, so as not to repress the growth of granulations, but to form a soft bed to which they may spring. The effect of the poultice is, by its warmth and moisture, to encourage such a degree of action as may promote the rising of the granulations. When the granulations have risen to the edge of the sore, then the practice must be altered, and the object is to adapt the granulations of the edge

to those of the surface. For this purpose, adhesive plaster or unctuous substances are employed, with a view of pressing down the granulations of the edge of the sore on those of the surface, so as to make them unite. These are the principles of treatment in the cure of ulcers. We first encourage the growth of granulations by the application of the gentle stimulus of poultices, and when the granulations have risen to the edge of the surrounding skin, we press down the granulations of the edge on those of the surface, either by the application of adhesive plasters, or of unctuous substances. The more unctuous such substances are the better; for the vessels will have a greater facility in shooting towards the centre, and the granulations embedded in this unctuous matter will more readily extend along the surface of the sore.

Impediments to the healing process.

Such are the principles of treatment applicable to ulcers in the healthy state; we shall now proceed to consider the impediments to the healing process which frequently occur, and which render a different mode of treatment necessary.

Granulations profuse.

The first circumstance which renders the cure of ulcers difficult, is the too prominent state of the granulations, producing what is vulgarly called proud flesh. In this state, the granulations rising considerably above the edge of the surrounding skin, are necessarily prevented from uniting with those of the surface. In order to prevent the continuance of this state of the sore, the common treatment is to apply dry lint to the centre of the sore, and some unctuous substance to the edges. The lint, by its pressure, prevents the growth of granulations in the centre, while the unctuous substance allows the granulations on the edge to proceed and inosculate with those on the surface of the sore. The lint should not be applied to the edge of the sore, for if it be, the granulations will be prevented from proceeding towards the centre of the sore. The nitrate of silver, and the sulphate of copper, are employed for the purpose of destroying luxuriant granulations near the edges of the sore. Here our practice is just reversed. Lint is applied to the centre of the sore, for the purpose of keeping down the granulations on the surface; whereas the caustic is applied for the

purpose of keeping down the granulations which are nearest the edge of the sore. In this way we promote the healing of the sore, forming a little circle by the caustic from day to day until we arrive at the centre.

Adhesive plaster is used with the same intention, *viz.* that of keeping down the granulations. The common adhesive plaster is, however, too stimulating for this purpose; a plaster, composed of equal parts of the emplastrum thuris compositum, and the emplastrum saponis, is a much better plaster to promote the healing of ulcers than the common adhesive plaster. This is a point deserving attention; because, if the application be of so stimulating a nature as to excite inflammation and excoriate the skin, we are often under the necessity of leaving off the adhesive plaster. It sometimes happens, that the action is so great as to oblige us to apply a sheet of lead to the surface of the sore; when this is necessary, you may apply a piece of lint covered with the ceratum cetacei, over these a piece of sheet lead, and round the whole a roller should be passed of about five yards in length. These are the various modes of treatment in this state of the sore.

Languid granulations

The next circumstance to which we shall advert, as giving rise to difficulty in the treatment of ulcers, is a languid state of the sore, in which its action is too slight. What is the character of such a sore? You may know that a sore is in this state, by the glossy and semi-transparent appearance of the granulations; instead of the florid hue which characterizes granulations in their healthy state, a considerable portion of them is bloodless. The fact is, that the vessels near the surrounding parts have not sufficient power to throw the blood to the extremities of the granulations.

Ung. hyd nit.

To remove this glossy appearance, and produce a healthy state of the sore, the application most commonly used is the unguentum hydrargyri nitrico-oxidi. This is a strong stimulating application, which occasions a determination of blood to the part, and produces a florid redness in the granulations, instead of the semi-transparent appearance which they assume in the languid state of the sore. It produces, however, a white appearance in the edge of the sore,

arising from the thickened state of the cuticle, which prevents the growth of the granulations on the edge. This may be corrected by the application of the unguentum hydrargyri fortius to the edge of the sore.

Lotions are frequently applied with the same view, such as the sulphate of zinc, in the proportion of two grains to one ounce of water; or the sulphate of copper, in the proportion of one grain to three ounces of water. The oxymuriate of mercury, and the liquor calcis, are also used for the same purpose. In addition to these applications, it will be necessary to bind up the sore with a roller, and to allow the patient to take a great deal of exercise; for without exercise, a healing disposition will not be produced in the sore. Lotio zinci.

It will be highly useful in these cases to employ some stimulating plaster, such as the emplastrum galbani compositum, for the adhesive plaster will not answer the purpose: the sores are languid, and the object is to increase the action in the part; this will be greatly assisted by giving the patient a nutritious diet, allowing him at the same time to take exercise, and, in fact, by doing every thing to improve the constitution. Empl. galb.

Well, the next stage of ulcers we come to, is that to be met with in patients on their admission into the hospitals. When the surgeon goes round the hospital on the first day after the taking in, he will meet with a number of persons with inflamed ulcers on their legs; and what, I ask of you, is the character of these sores? You know that there is a serous discharge from these wounds, a bloody ichor, composed of serum and the red particles of the blood—a disposition in many cases, to slough—that the surface is covered with a brown incrustation, and the skin and surrounding parts are highly inflamed. Well, then, you will find that the same treatment which is applicable to inflammation in general, will be of service in these cases, where inflammation has been kept up for a long time to a high degree. Rest must be enjoined; the patient must also keep in bed in the recumbent posture. Fomentations and poultices must be employed: fomentations will tend to produce a secretion Inflamed ulcers. Rest enjoined.

from the part; and poultices, by their soothing quality, to promote the growth of granulation; both will evacuate the matter from the wounds. Then, with these applications, the vessels begin to form, the sore assumes a better appearance, healthy secretions are thrown out, and granulations shoot up; fibrous matter is deposited, and in a little time you will have the skin covering the wound. Fomentations, poultices, rest, and the recumbent posture, must be enjoined, and the patient must be purged The best cathartic that you can administer is calomel and compound extract of colocynth, five grains of each at bed-time, and a draught of the infusion of senna and sulphate of magnesia on the following morning. By this plan you will do more to subdue the inflammation than by any other I know. If the part in the neighbourhood be much inflamed, leeches had better be applied near the circumference of the ulcer: with this treatment, in a very few days granulations will spring up, pus will be secreted, and the surrounding edges will assume a healthy appearance. Without, however, attending to the constitutional treatment, all your local applications will be of very little avail.

Gangrenous ulcers.

Gangrenous Ulcers.—This kind of ulcer you will very frequently see in a man, who has been in poverty and distress for a long time, going up and down the streets of London, looking out for an asylum where he may rest his head; this person comes to the hospital at last, in a reduced and emaciated state. When you see a wound of this description, you will know it by the surface being perfectly free from discharge; the surrounding edges of a livid appearance, with small vesicles or blistered spots on them; and the patient suffering much from irritative fever. Seeing this state of the wound, then, you enjoin the patient the recumbent posture, which is essentially necessary to promote the separation of the dead parts.

Principle of treatment.

The principle of treatment in these cases is to produce a very slight increased action in the part. Sometimes, when the action is excessive, you must, on the contrary, soothe the part:—both will be sometimes good. When there is debility of the part, a slight

stimulus should be employed; but when there is excessive action, it is to be avoided.

Nitric acid.

The best application that I know for producing a slight stimulus and checking gangrene of the part, is the nitric acid; there is none equal to this: fifty drops of it to a quart of distilled water, will be found a most useful remedy. The acid may be increased to a drachm; this may be done or not, just as it may give pain to the part; but, generally, the average quantity is fifty drops. I have seen, in a short time after this application, a quick separation of the parts from sloughing, to which there is always a tendency; and healthy granulations spring up, being, as the chemists would call them, oxygenated; that is to say, the carbon being thrown off from the arterial blood in the vessels with which they are supplied. Here the granulations are of a beautiful florid red: this, then, is a most useful remedy

Oiled silk.

Oiled silk should be applied to the wound, so as to prevent the smell arising from the parts tainting the room; for it is always considerable when the process of sloughing is taking place, and granulations are arising; an advantage, though a slight one, compared with the others, in the use of the nitric acid, is, that the offensive smell is nearly taken away by it, the sulphuretted hydrogen is destroyed. Another very good application to sores of this kind is nitre, in the proportion of one drachm to a pint of water; this agrees very well with the sore, and has the same effect, though in a diminished degree. It appears that all the combinations of the nitric acid are good. Sulphuric acid is of use also in these cases, six drops of the acid to an ounce of water. The muriatic acid has not the same effect as the other two. If nitric acid be applied to the wound, the granulations will assume a red and healthy look: if the sulphuric be, they will have nearly the same appearance; but if the muriatic acid be put to the wound, it will be seen that it will have a comparatively slight effect on the granulations, and, therefore, it is an inferior remedy in the treatment of these wounds. Poultices made of port wine, porter, dregs of lees, yeast, a large spoonful of it to a pint of meal, may be all used.

Variety of dressings.

Gentlemen, you must have recourse to a great variety of applications; for, after you have tried one, which at the beginning did good, you will, from the wound getting worse under its use, be obliged to change it for another, and so on. There is at this time a girl in the other hospital with sloughing of the pudendum; a variety of means have been used, all of which, at the outset, relieved her a little; but none continued to do her good for any length of time, and she will, most probably, in the end, fall a victim to the disease: it is upon this account that I mention to you so many remedies. The carrot-poultice is also a very good application. The constitution of the patient must be attended to, or else the local means will do very little; therefore, local applications must be aided by constitutional remedies; and what is the best medicine that you can administer?—opium and ammonia, gentlemen; twenty drops of tincture of opium, three times a-day, with ten grains of the ammonia, in an ounce and a half of camphor mixture, and a little (one drachm) of compound tincture of cardamom.

Case

Constitutional means.

This is the medicine which will agree best with the patient. He must be well nourished, or at least he must have as much as his digestive powers will allow; port wine also must be given, and spirits must be allowed to those who have been addicted to their use. By brandy and opium I have seen these sores cured; in fact, they are our sheet-anchors in the treatment of these ulcers. But more of this in another lecture, as I shall have to speak of gangrene again.

Irritable ulcer.

The next kind of ulcer that I come to is the *Irritable Ulcer*.

This sore is extremely difficult to cure. How then are you to know it? When you find the granulations most unequal; in some parts being very high, in others very low. The discharge from the wound consists of a bloody pus. I do not know what to compare it to better (though it is not quite so good) than strawberry cream. (*A laugh.*) It is pus mixed with the red particles of blood. This sore may be known by the inequality of the granulations, the nature of the discharge, and the great pain and tenderness in the part; so that the patient, when touched in that part, is like a

sensitive plant. As you will be sure to find considerable difficulty in the treatment of these sores, I will tell you, the best application that you can make use of is one compounded of the cetaceous ointment, gray oxide of mercury, and powdered opium:—

℞ Unguent Cetacei
Hydr. Nit. ℥ss.
Pulv. Opii ʒj. M.
Fiat unguentum.

This must be spread on lint, and applied to the part twice a-day. What are the internal remedies you ought to exhibit in these cases, gentlemen?—calomel and opium: these are the medicines on which you are to rely; a grain and a half of calomel and a grain of opium morning and evening. Nothing will be of so much service as this medicine.* It should not be carried so far as to produce ptyalism, or to affect the constitution severely; but it should be given so as to restore the secretions, and to diminish the action of the nervous system. The calomel will do the first, and the opium will lessen the nervous irritability. The treatment of inflammation has been improved of late by calomel and opium.

Iritis.

The effect of this medicine in chronic inflammation may be seen in the disease called iritis. Here calomel and opium may be exhibited; nor should a deposit of white matter, having the appearance almost of pus, into the anterior chamber of the eye, be any barrier to their use. Give five grains of calomel and a grain of opium night and morning; and in the space of a week, if the eye has not suffered a good deal, or become disorganized, this remedy will correct the inflammation. We use other aids, such as the compound decoction of the sarsaparilla. Some think it a placebo; others have

* Messrs. Reynolds, Gunton, & Co., Wholesale Druggists, in the Borough, prevailed on me to try the Naptha Barbadensis, as a dressing to indolent or intractable ulcers: and in justice to that article, I have no scruple in placing it amongst the most important therapeutic agents in such cases. My mode of applying it is thus: I spread the Naptha on thin paper, termed double crown, with which I cover the ulcer, and on a stronger paper I employ it as a strapping, on the principle of Baynton.—L.

a very high opinion of its efficacy. I do not think much of it myself in those cases; but, after the use of mercury, it diminishes the irritability of the constitution, and soon soothes the system into peace. With this view, its aid, combined with other remedies, may be of use.

Case.

So much for irritable ulcers. Before I conclude this part of the subject, however, I will mention a case which just occurs to me: I allude to that of Mr. Lucas, the surgeon of the other hospital. That gentleman, in consequence of having pricked his finger, had a very irritable sore, which obliged him to go into the country, where he remained for a considerable time. The remedy which he found most efficacious for bringing the sore into a healing state, was the application of a solution of nitric acid, very much diluted, and the compound decoction of sarsaparilla. From the latter he thought he derived considerable benefit. By these means, and by attention to his general health, he effected a cure; but his life was in considerable danger, from the irritable sore produced by this apparently trivial accident.

Sinuous ulcers.

Sinuous Ulceration.—It is necessary to explain here well what I mean. Whenever, therefore, a sore extends to any considerable depth, so that the discharge has to travel through a channel before it arrives at the surface, such an ulceration is called sinuous. There are two reasons why these ulcerations are difficult to heal: first, from matter forming at the bottom, forcing its way through the passage, and thereby disturbing the healing process, by breaking down whatever adhesions or granulations form on its sides; and, secondly, the same interruptions occur from the actions of the muscles, when these ulcerations happen in muscular parts. Thus, if the healing process has commenced in fistula in ano, when the sides of the fistula are at rest, the first time that the person has a motion, the sphincter ani, by its action, will destroy all the newly-formed adhesions and granulations; consequently, if the sphincter be divided, and the parts have rest, granulations will form, remain undisturbed, and a cure be the result: this clearly shows that the motions of the sphincter occasioned a continuance of the evil.

Sometimes in these cases, for the purpose of exciting the adhesive inflammation, injections are used. Now, which is the best? In my opinion, tinctura lyttæ: it readily produces inflammation; adhesive matter is thrown out; you take care to keep the sides of the sinus in contact; and by these means the parts will permanently coalesce. Sinuses of the rectum, however, are seldom cured without an operation; indeed, I have met with but two such cases: one was that of a gentleman who came from the north of England; he had been annoyed by a fistula on each side of the anus, one of which was operated upon by the late celebrated Mr. Hey, of Leeds. He was cured on that side by the operation; but as it was attended with great loss of blood, the patient was too much frightened to be cut again, and came to town for my advice. I examined him, and finding that there was considerable space between the anus and fistula, I advised him not to submit to the operation, and said that I would try to relieve him without it. I first injected port wine and water: this did not answer—it was not sufficiently powerful. I therefore threw in port wine alone, and succeeded in obliterating the canal. I was fortunate in this instance; for I can assure you that fistula in ano is seldom, very seldom, completely cured without an operation. When you do not succeed by injection, you may employ the caustic bougie. Still pressure will be necessary; and it is quite impossible that you can succeed without it. When the fistula is very deep, it may be divided into two; or a seton may be introduced, and kept in for a fortnight or three weeks, with a view of stimulating the parts for the purpose of filling the cavity with granulations. Stimulants employed.

LECTURE XIII.

THE SUBJECT OF ULCERS CONTINUED.

In this evening's lecture, I shall continue the subject of ulceration. Ulcers are frequently formed for the purpose of allowing the dis- Extraneous bodies.

charge of extraneous bodies; when such substances become lodged, therefore, in any part of the human frame, inflammation is excited —pus becomes secreted, which, pressing towards the surface, ulceration takes place, and the extraneous substance is thus afforded an opportunity of escaping.

Exfoliation.

Ulcers frequently occasion, to a very considerable extent, exfoliation of bone: here you can assist nature by applications which act chemically on the parts; apply, for this purpose, a lotion composed of muriatic acid and water, or nitric acid and water; this wash will dissolve the phosphate of lime, or earthy matter of the bone; and by removing this inanimate substance, the power of the absorbents will be increased, and a quicker separation of the diseased from the healthy parts be the consequence. The acids, however, have not so great an influence in these cases as you might be led to expect from what chemical writers have stated; still, however, you will find them to be of use, and they should therefore be employed.

Irritation of the nails.

Ulcers which occasionally form on the fingers and toes are sometimes exceedingly difficult to heal, from an irritation caused by portions of the nails. You may think this too trifling a subject to require a moment's consideration; but I can assure you the truth is far otherwise. A nail, for example, from pressure or some other cause, shoots into the skin beside it; a fungus springs up: the surgeon applies caustic and destroys it: in a short time it rises again; the caustic is repeated, and the fungus disappears; it speedily, however, returns, and will continue to do so, notwithstanding all his efforts to the contrary, unless he remove the irritating cause. Now this cause is the projecting portion of nail; as soon as that is got rid of, the fungus will cease to grow, and the ulcer immediately heal.

Treatment.

The best methods to adopt for the purpose of radically relieving these troublesome affections are as follow: pare down the nail as thin as you can without producing bleeding, then raise it a little, and introduce between it and the sore a small piece of lint; in this way the irritating cause may generally be removed. It sometimes happens, however, that the sore is so exceedingly irritable, that

even lint cannot be lodged on its surface without producing great increase of inflammation and pain: in such cases what I do is this: —with a pair of scissors I slit up the nail on that side where the disease exists, and then with a pair of forceps turn back and completely remove the divided portion. This is a very painful operation certainly, but I have known persons get well by this treatment in ten days, where the complaint had, for months, resisted every other. The applications to be used after the operation are of little importance; poultices are the best, and these will be required but for a very limited period; for the irritating cause having been removed, the fungus will soon disappear.

The next best plan to be adopted, for curing these cases, is the application of a blister; this brings away the cuticle, and often the nail along with it. The most lenient method is the one first mentioned, *viz.* the introduction of a piece of lint. Mr. Hunter, in alluding to this disease, said that the parts were not in a state of harmony. This is very true, and a very proper expression; he also applied it to those cases where a disease in the gland producing the nail, causes the nail to turn black; such affections are not uncommon, and are often thought to be syphilitic, and I have frequently known persons salivated in consequence. This opinion, however, is perfectly erroneous. You must wash the sore with liq. calcis and calomel, and administer the pil. hydr. submur. comp. and decoct. sarsæ. By blister.

Sometimes, in these causes, we are obliged to dissect out the gland that produces the nail; and though the operation is a most painful one for the patient, yet we are, for the purpose of affording permanent relief, compelled to perform it. Entire removal.

Whitlow, what is it? Why, an exceedingly painful swelling, terminating in an abscess by the side of a nail. The principle is this: the matter forms at first under the nail, but, being unable to force its way through that horny substance, burrows under it, thus producing excessive pain and irritation. Fungous excrescences often arise in these cases, which induce the surgeon to apply caustic; this practice is worse than useless. You should, after fomenting Whitlow.

or poulticing the part, remove the loose portion of nail; this permits the matter to escape, and instantaneous relief is the result.

Menstrual ulcer.

The next ulcer that I shall describe is the *menstrual;* I mean by this, a sore which is once in three weeks or a month covered with blood. This complaint is connected with amenorrhœa. In going round the hospitals, you all must have observed that females will one day have their sores covered with pus, and probably on the next day covered with blood. In fact, the menstrual ulcer is of very common occurrence. You must wash these sores with liq. calcis and calomel, give to the patient the mist. ferr. c. myrrh. and pil. hydr. submur. comp., one ounce and a half of the former twice or three times a-day; and five grains of the latter every night at bed-time. These medicines will generally succeed in improving the state of the constitution, by restoring the defective secretions.

Ulcers from varicose veins.

The next ulcers that I shall describe are those which arise from *varicose veins;* and here I shall detain you for a few moments, as the subject is one of some importance. The veins in different parts of the body often become varicose, but those of the lower extremities by far the most frequently so. This condition of the vessels may arise from a variety of causes; but the more immediate one appears to be either a thickening of the valves, so that they are incapable of approximating, or a rupture of the valves: in either case the effects will be the same—the blood pressing in one uninterrupted column—the veins become distended and serpentine, and the valves widely separated from each other—their arteries, by their powerful attempts to return the blood to the part, soon excite inflammation, and ulceration quickly supervenes. What are the common effects produced here by the first desquamation of the cuticle? Why, the whole surface covering the diseased veins is formed into a crust, under which a quantity of serum is secreted.

Treatment.

The first thing to be attended to in these cases is the recumbent posture: in fact, this position is indispensable; you can do nothing without it. Lint wetted by the mercurial wash should be laid on the ulcers—oiled silk over these, and then the limb should be well and regularly bandaged, beginning at the foot. The bandage allows

the valves to recover their lost action, and consequently will be found to be highly useful. Another great benefit is derived in these cases from opening the veins; indeed, they are so distended, that they may more properly be termed lakes than rivulets. If you do not open the vessels you will find considerable difficulty in the progress of cure.

The best plan that you can adopt is to puncture them by means of a lancet, twice in the course of every week as long as you think they require it; let the bandage be afterwards applied, and the parts kept wet by means of evaporating lotion. No danger whatever attends the opening of these veins, and very great relief will be afforded by it. If the punctures, however, at any time should not unite, but fret into ulcers, you must apply to them the liq. calcis and calomel. It often happens that persons, who, for any length of time, have had the veins of their lower extremities in a varicose state, will find at night a great quantity of blood in their shoes; the crust before alluded to coming off is the cause of the hemorrhage. Upon being called to a patient so situated, you put him in the recumbent posture, apply a bandage, wet the part constantly, either with the spirit wash or cold water, and in all probability you will soon get rid of the disease altogether. Puncture.

Pregnancy is a frequent cause of varicose veins; so also is obesity.

It was formerly the practice, when the veins were in a varicose state, to tie and divide them. This plan is still pursued by many surgeons; but it is one, gentlemen, that I have deprecated in my lectures in this theatre for the last eight or nine years; it is bad treatment, very injudicious, and fraught with great danger; therefore let me exhort you never to sanction it. I have seen this operation prove fatal in two instances in these hospitals; therefore I was induced to say that it did not succeed, and have for years spoken against it. Mal-practice.

A gentleman of Nottingham informed me, that he had tied the vena saphena, for a varicose state of the veins of the leg in a young farmer, in other respects healthy, and the operation proved fatal. The same lamentable catastrophe occurred to a most respectable Case.

practitioner at Brentford; and both these gentlemen told me, that they would not again perform the operation for the world. If I were to tell you all the cases in which I have known it terminate fatally, I should recount at least a dozen. Another *overwhelming* objection to the operation is, that when it does not prove fatal, its ultimate effects are perfectly nugatory. If I were asked which of the following operations I would rather have performed upon myself, *viz.* the saphena major vein, or the femoral artery tied, I certainly should choose the latter. When an artery is tied, the inflammation is *above* the ligature, but in a vein it is below; in this case, the vessel becomes terribly distended, the inflammation uncommonly severe, and either extensive suppuration, mortification, or death, the result.

Travers on Varix.

Mr. Travers has written an admirable essay on this subject, which well deserves your attentive perusal.

Ulcers are sometimes occurring in the cellular membrane, forming what we call *chronic carbuncles*.

Carbuncle

When the constitution is impaired, from whatever cause, it frequently happens that small swellings will form under the skin. At first they are red; then turn purple; and ultimately slough. The ulcerative process is slow in those cases. A white substance will soon be perceived at the bottom of the sore, and, as soon as this comes away, healthy granulations will rapidly form, and the wound become healed. Constitutional treatment, however, in these cases, must not be forgotten; for unless you improve the general health, the ulcers will not get well.

Treatment.

You should administer aperients, such as the infusion of senna, Epsom salts, &c., and give alteratives—the Plummer's pill will be found the best. For females, where great general debility has given rise to the formation of these sores, no medicine can equal in power the carbonate of ammonia. I shall have frequent occasion to allude to this. I generally give it in the following form;—

℞. Ammon. Carb. ʒss.
Aq. Menth. Virid. ℥v ss.
Tinct. Cardam. Comp. ʒss.
M. ft. mistura. Cujus cap. coch. duæ 4ter. in die.

If any one medicine improves the nervous system when deranged, more than another, it is this. I have often prescribed it for females when in a state of extreme weakness, and its effects are truly astonishing: two table-spoonfuls of the mixture may be taken four times a-day. If the poultices have not the effect of exciting the granulating process, you may wash the sores with the liq. calcis and calomel lotion, or gently touch their surface with the nitrate of silver.

Cutaneous ulcers.

It not unfrequently happens that the skin, in various parts of the body, gets into a state of *superficial ulceration*, and without any evident cause. The best applications in these cases are the yellow wash: ungt. hydr. nit., or the ungt. zinci oxydi. The internal use of the oxymuriate of mercury will likewise be found particularly beneficial and salutary; give it in the formula mentioned to you in a previous lecture, *viz*. in conjunction with tincture of bark: a small quantity of this mixture should be taken in a little white wine, once or twice daily, according to the age and symptoms. This medicine will be found a very valuable one, when the above-mentioned ulcerations are connected with disease of the mesenteric glands.

Noli me tangere.

There is an ulcer often existing on the face, called *noli me tangere*, which name imports nothing more than that you must not touch it. This disease has never been correctly described; the truth is, that it is an ulceration of the glands or follicles of the nose, those small cavities from which you can squeeze sebaceous matter; the ulceration extending deeply, at last even the cartilages of the nose become destroyed; the plan of treatment to be pursued here is as follows, you must get prepared an ointment according to the following prescription:—

℞. Arsenic Oxyd.
Sulphur Flor. ℥ss ʒj.
Ungt. Cetacei ʒj.
M. fiat unguentum.

You must spread some of this ointment on lint, lay it on the ulcer, and leave it there for twenty-four hours; then remove it; a slough will come away: you dress the ulcer with some simple

ointment, and it will generally heal. If the ulcer is not deep, you may cure this complaint without using the arsenical preparation, by merely painting the surface of the sore with a solution of the nitrate of silver. You must be cautious, however, in your manner of using this application.

Case.

A gentleman once came to me with an ulcer of the kind of which I am now speaking, and which I painted in the manner described to you with a camel-hair brush. In the course of the day, when at Lloyd's, he was asked by some friends what was the matter with his nose; for they told him it was quite black; and, in point of fact, it was so. I was not aware, at the time, that a solution of the nitrate of silver would have produced that effect; and I merely mention the circumstance, that you may be on your guard. Deep ulcers, having a malignant aspect, often remain in the faces of old persons, without producing any ill consequences, though, from their appearance, they portend the most direful effects. To such sores, the best application is the lotion, composed of liquor calcis and calomel.

Gouty habits.

In gouty habits, ulcers frequently form in joints, arising from inflammation caused by a deposition of the urate of soda. Persons will come to you with many joints open from this cause. A gentleman came to me from the country, thus circumstanced. Several of his joints were quite exposed, and the cartilages of some of them absorbed. I found in each of these joints a lump of the urate of soda; therefore, when it is necessary, you increase the openings through the skin, remove the urate of soda, that being the exciting cause of the disease.

Ulcers with thickened edges.

Occasionally, the thickened state of the edges of ulcers impedes the healing process. These edges must be adapted to their surfaces, and this may be done by means of the empl. galban. comp., which will remove the indurated cuticle, and stimulate the parts to action; if this, however, should not succeed, you may use the ungt. hydr. fort. or ungt. lyttæ: or you may, with a lancet, scarify the edges, and this method will often succeed when every other fails.

The edges of sores are sometimes very much *inverted;* constitutional treatment, as well as local, is necessary here. With respect to local, the application of the nitrate of silver to the edges,

and the black wash to the surface of the wound, are generally all that will be required: and the constitutional medicines I have so often mentioned to you must be regularly given until the ulcer heals.

Some sores have their edges very much *everted*, and this affection is commonly symptomatic of a cancerous diathesis; the usual methods of treatment practised in these hospitals is to poultice such ulcers; to attend particularly to the condition of the general health, until the edges have resumed a natural and healthy state. The admirable mode recommended by Mr. Baynton, should be had recourse to, which, by approximating the sides of the wound, and thus facilitating the processes of granulation and cicatrization, will more surprisingly contribute towards the completion of the object we have in view. With everted edges.

LECTURE XIV.

ON GANGRENE.

Having traced inflammation through its adhesive, suppurative, and ulcerative stages, I shall now proceed to consider it in its most destructive form, namely, when it exists in such excess as to produce gangrene. We find that inflammation, when it is extremely active, occasions a destruction of vital power. At other times, when there is a less degree of inflammatory action, but where the powers of the part are feeble, the life of the part will also be destroyed; so that gangrene is produced either by an excess of inflammatory action, where the powers are natural, or by a less degree of inflammatory action, where the powers of the part are feeble. Gangrene.

Gangrene may be considered as a partial death. This is its definition: the death of one part of the body, while the other parts are alive. Definition.

The symptoms of gangrene differ according to the manner in which it is produced. When gangrene is the result of high and active inflammation, the pain attending its production is exceedingly Symptoms.

severe; the inflammation is very extensive; there is usually a blush to a considerable extent; and there is generally, though not always, a considerable degree of swelling. The secretion from any sore which may exist ceases, for the skin no longer perspires. The surface of the skin becomes of a dark colour; it is said to become purple, but it is rather of a brownish tinge. The cuticle is raised, a vesication is produced, and when this breaks, it is found to contain a bloody serum. When this serum is discharged, the skin assumes the gangrenous appearance, and becomes perfectly insensible. The vesication extends to parts beyond the ulceration; thus in sores of the leg we frequently see a large portion of the skin giving way, and the gangrenous vesications extending beyond the ulcerative surface.

Constitutional symptoms.

The constitution suffers considerable derangement from gangrene; there is a high degree of irritative fever, and the pulse is often exceedingly quick. The pulse is generally said to become slow when gangrene takes place, but I have never observed this. I have indeed occasionally remarked but a few beats in a minute, because it is very frequently intermittent. Still the pulse is quick, though occasionally intermittent. It is said also to become soft, but I should not say that this is the character of the pulse in gangrene. It is quick, very small and thready, and generally irregular.

Delirium and hiccough.

Gangrene seldom occurs without delirium, and it is attended also with vomiting and hiccough. Hiccough, indeed, is the characteristic sign of gangrene, and it takes place though the gangrene may be situate in a part very distant from the stomach; as for example, in the toe. The fact is, that when gangrene arises from a diseased state of the constitution, the stomach is extremely deranged, and this derangement of the stomach is followed by a spasmodic contraction of the diaphragm, producing hiccough. This symptom does not arise from any alteration in the action of the diaphragm, but from its sympathy with the deranged state of the stomach. If you wish to correct hiccough, you may arrest it for a time by giving some slight stimulus, or even by adopting opposite means. Thus a glass of cold water will suspend it for a considerable time.

Gangrene from feeble action.

Such are the symptoms when gangrene is the result of excessive

action. But gangrene is sometimes the effect of a low degree of inflammation; as when it is produced by the application of cold. When a great degree of cold has been applied to any part for a considerable time, the part will become benumbed; that is, its nervous powers will be diminished: and when it is thus enfeebled, it will be unable to bear a very slight degree of supervening inflammation, so that gangrene will be produced, and the destruction of its life will follow. In this climate, however, destruction of the life of the part does not in general immediately follow. A person will come to the hospitals with his feet benumbed; he may have been wandering about the streets, unable to find a place of refuge; until he becomes, from this cause, incapable of walking. Great care must be taken, in these cases, not to apply heat very suddenly; even the common heat of the bed frequently occasions inflammation, which is extremely liable to proceed to gangrene, in consequence of the diminished nervous influence of the part.

I knew a gentleman of the first consequence in this country, and whose death occasioned perhaps as much regret as that of any one who has died for many years, who lost his life from an act of imprudence. He had been out shooting, and had exposed himself to severe cold; and finding his feet benumbed on his return, he immediately put them into warm water. The consequence was, that a gangrene took place, of which, notwithstanding all the care that could be taken of him, he died. In this climate it generally happens that inflammation succeeds the application of cold after an interval of two or three days. By the use of some slight means of treatment this inflammation is generally suspended, and it is by the repetition of the inflammation, rather than by its severity, that the powers of the part become at last exhausted. In colder climates than our own the part exposed to cold becomes white, and the suspended circulation is commonly restored by rubbing the part with snow. If it be not very carefully treated, however, inflammation and sloughing is apt to come on. If a part be completely frozen, inflammation frequently ensues in a short time, and, after

Case.

continuing for a few hours, is followed by a destruction of the vital power.

Process of Separation.

These are the symptoms which we observe in cases where gangrene is the result either of a high degree of inflammatory action, or of diminished power. When gangrene is produced by either of these causes, the process of separation soon commences. This process is one of the most curious operations of nature in the human body. There is nothing more extraordinary to my mind than the power which nature possesses of separating even large members without any danger from hemorrhage, or the smallest jeopardy to life. Thus we see a limb of considerable size separate without in the slightest degree endangering the life of the patient. There is an instance of this at the present time, in the other hospital, in a case of popliteal aneurism, which will afford you an opportunity of judging of this process of separation for yourselves.*

Separation of the skin.

The first appearance which we observe after the destruction of the life of any part is a white line, which nature forms for the separation of the dead from the living parts. For this white line we anxiously look, since it is the barrier which nature sets up between the dead and the living parts, and it becomes a criterion of the cessation of the gangrenous disposition. At this white line the cuticle is raised. This elevation of the cuticle is a vesication, which forms a line of circumvallation around the gangrene. When the cuticle becomes separated, as it will in two or three days, we find a chasm beneath it, produced by the absorption of the living skin in contact with the dead. The living skin is taken up by the absorbent vessels into the constitution, and in this manner the living parts are separated from the dead by a process of nature. If we were to reason *à priori* on this subject, it might be expected that the absorbent vessels would rather remove the dead portion of skin in contact with the living; but this is not the case. The absorbent vessels act on the living parts, but not on the dead: nor is the dead skin absorbed after the time when granulations have

* This man's leg separated through the calf.—L.

formed, but it becomes loose, and ceases to attach to the surrounding parts; the chasm formed by the absorbent vessels affording an opportunity for the separation.

Separation of cellular tissue.

The next part which begins to separate is the cellular tissue immediately under the skin. Gangrene proceeds to much greater extent in the cellular tissue than in the surrounding skin, because the cellular membrane is a part of weaker living powers. It is for this reason that a sloughing disposition in sores extending to the cellular membrane is so dangerous. A small chancre beginning in the pudendum of the female, and sometimes in the penis, will frequently occasion destruction of life in the part. Some persons have absurdly supposed that these sloughing sores are not chancres, because they have not the common venereal character. But how does this happen? If a chancre forms in the pudendum of an irritable female, and has a sloughing disposition, it extends into the cellular tissue, inflames to a high degree, and produces gangrene. In this manner the character of the chancre becomes destroyed. There is at this time an unfortunate female in the other hospital, who has lost a considerable portion of the external organs of generation, in consequence of a sloughing chancre. The hospitals teem with such cases: and indeed this deplorable result is always to be expected when a sloughing chancre extends into the cellular tissue, a part naturally weak, and rendered weaker in these persons from their irritability and mode of life.

Separation of muscle.

The next part which separates is muscle. Muscles separate nearly opposite the edge of the skin. Wherever the skin separates, the muscle gives way; a line of separation is formed, and the living portion of muscle is taken away from the dead. This is not the case with tendons; these, like the cellular tissue, do not separate opposite the skin, but at a considerable distance from the part at which the sloughing takes place. If a tendon is exposed in the palm of the hand, by a sloughing ulcer, it separates at the wrist, for it is incapable of resisting the inflammation, in consequence of its weak living powers, and separates therefore at the part where it joins the muscle.

Tendons.

Separation of nerves.

The nerves separate, like muscles, opposite the skin. But the most extraordinary instance of the process of separation is that which takes place with respect to the larger blood-vessels.

Separation of arteries.

What would be the result, if you were to separate with the knife the anterior and posterior tibial arteries, without placing a tourniquet on the limb? The person would die in a few minutes. Yet nature cuts through these vessels, and frequently divides the arteries I have mentioned, without a drop of blood issuing from the limb. This happens in the following manner:—the blood in the vessels of the dead part becomes coagulated; the coagulum, however, does not confine itself to the dead part, but extends to the living vessels which join it, and is, in this manner, glued to the inner side of the artery, so that the vessels are, as it were, hermetically sealed; and not a drop of blood can escape by the side of the coagulum. The same thing takes place in veins, the coagulum adhering to the inner side of the living vein, so that no blood can escape. If you amputate a limb at a considerable distance from the part at which gangrene has commenced, you will still find the vessels sealed.

First case of amputation.

The first amputation which I ever performed, was in the case of a gentleman who had a gangrenous ulcer near the head of the tibia. In this case it was necessary to amputate above the knee, as sufficient skin would not have been left if the amputation had been performed below. When I loosened the tourniquet, I was surprised to find no femoral artery. On a closer examination, I found that the inner side of the femoral artery was completely plugged up, and sealed by the coagulum, which had extended at least six inches above the place at which the gangrene had occurred; it appears, therefore, that the artery is not only sealed at the place at which nature cuts through it, but at a considerable distance above it, in order to provide against the danger which would arise from a separation of the coagulum.

Separation of bones.

Bones, at last, become separated; but this process is very slow; and it is a long time before they exfoliate, loaded as they are with phosphate of lime. Hence we are often under the necessity of taking away bones, when the process of separation is in other

respects complete. I am anxious, whenever I have an opportunity in these lectures, to refer you to cases actually existing in the hospitals; and you cannot have a better opportunity of observing the process of nature with respect to the separation of bones, than in the case of popliteal aneurism, to which I have before directed your attention. This man underwent the operation for aneurism in the other hospital. The aneurismal bag had been loaded with fluid blood for a length of time; the process of gangrene commenced at the ankle; all the soft parts were absorbed, and there is nothing now remaining but a portion of bone, which will also separate, if we permit it to do so. The saw would quicken the process, but it is unnecessary, for the bone will separate by the efforts of nature alone.

Case.

I knew a person in the county from which I came (Norfolk), whose leg entirely separated by the process of gangrene alone. In the foot this very commonly takes place; in the calf of the leg it is not common, but below the calf, it frequently occurs. I attended one of the king's messengers, some time ago, who came from Germany, with a gangrene in the foot. The foot separated at the tarsus, and the whole process went on without any surgical operation, and with nothing but the aid of the simplest applications.

Gangrene the effect of debility.

Gangrene is frequently the effect of a debilitated state of the constitution. Thus, if a man have been confined by long continued fever, the nates are apt to slough and become gangrenous in consequence of the imperfect circulation, arising from the position in which he has been forced to remain. Some fevers have a greater tendency than others to produce gangrene; as for example, scarlatina. In slight cases of scarlatina, the most horrible effects will sometimes arise from gangrene. The tonsils will slough to a great extent, parts of the Eustachian tube, and even the tympanum will separate, and large portions of bone exfoliate. The worst effects of this kind are observed in those cases of scarlatina where the fever is not the most violent.

The measles are very apt to be followed by sloughing, unless great care be taken not to irritate the skin of the chest too much.

In this town it sometimes happens, that a large blister applied to the chest of a child labouring under measles occasions a high degree of inflammation, producing gangrene, and endangering the life of the patient. In constitutions of an unfavourable kind, I have often seen the measles produce a slough forming a black aperture in the cheek of the child, through which its food was passed, and life soon destroyed. Mercury, if used to excess, often excites sloughing, from the fever and consequent debility of the constitution which it produces. Whatever, in short, weakens the constitution much, disposes it to the production of gangrene; for the body, when thus debilitated, cannot bear any excess of action.

Gangrene from cold.

When the application of cold is the cause of gangrene, the effects are produced very much in the same way. The powers of the part to which the cold is applied are diminished, and this diminution of power leads to the destruction of the part, under the first excess of action.

Effect on the tendons.

There are some parts of the body naturally constituted feebly; as for example, tendons. When inflammation attacks a tendinous structure, it runs very readily into a state of gangrene. Hence the danger of making incisions into a tendinous structure, which frequently affect the nervous system with the highest degree of irritability, and produce tetanic symptoms. It is not the injury to the nerves which produces tetanus, but the sympathy of the nerves with the injury to the tendon.

General rule.

It may be stated, as a general principle, that inflammation is the cause of gangrene; gangrene very rarely happens without inflammation; but as there are some exceptions to this general principle, I will mention them.

Gangrene not the result of inflammation.

I have seen, in a case of hydrothorax, a small spot in the legs become at once black, without any appearance of inflammation, and extend itself until it occupied a very large surface. Here the total absence of circulation, and not an increased degree of it, occasioned the destruction of life in the part. So we now and then see aneurism producing gangrene. In the case of popliteal aneurism, to which I before adverted, the gangrene is produced, not by the

bursting of the aneurismal bag, but by the pressure of the bag on the vessels, occasioning the destruction of life in the limb below.

I saw a gentleman a few months ago, who was on the point of death from the pressure of an aneurism. His foot afterwards became gangrenous. He did not die, however, for separation of the foot and part of the leg took place, and he ultimately recovered. Case.

So much for impeded circulation without inflammation, as a cause which sometimes produces gangrene. The division of a considerable blood-vessel will sometimes produce the same effect. I believe I have already mentioned in the lectures, the case of a gentleman who was stabbed in the groin by a foreigner, with a dirk or sharp knife. He was stabbed just in the femoral artery; considerable hemorrhage took place, which was stopped by a ligature on the artery; but the leg afterwards became gangrenous, and it was necessary to perform the operation of amputation. Gangrene from the division of an artery.

Since I commenced these lectures, I have seen a most melancholy instance of a gentleman in the prime of life, who died from gangrene, in consequence of an injury to the femoral artery. This gentleman was thrown out of a gig, as he was going down a hill, and the wheel of the carriage went over his thigh. When he was taken up, it was found that he had a simple fracture of the femur. Every thing which attention and skill could do for him was done; but some peculiarities were immediately observed at the time of the accident. The lower part of the leg was quite insensible; it was considerably swelled and hard. After lying in bed for a week, the patient became so restless that he wished to be removed. This was done in the gentlest possible manner. He did not, however, experience the relief which he expected from a change of position, and the swelling was in some degree increased. Case.

I was then sent for; and when I saw him, I was surprised to find that gangrene had already commenced at the knee. This was hardly to be expected from a simple fracture; for it so rarely happens that the femoral artery is injured by a fracture of the thigh-bone, that amongst all the cases of fractured femur which I have seen in the course of my life, I never yet met with an instance

in which the artery was injured. However, from the immediate insensibility of the limb at the time of the accident, from its coldness, from the swelling which accompanied it, and also from the pulsation which existed opposite to the fracture, I was led to believe that the femoral artery was torn through. The question then arose whether we should amputate or not. Upon examination, I found the limb emphysematous; the air had extended into the cellular tissue up the thigh to the abdomen, and putrefaction had already commenced. I perceived, therefore, that the patient had but a few hours to live, and that it was useless to put him to the pain of an operation.

Sectio-cadaveris.

Upon examination after death, by the medical gentlemen at Rochester, where the patient resided, it was ascertained that the femoral artery was divided. It seems extraordinary, when we contemplate the situation of the thigh-bone, that a fracture of it should not, in one case out of ten, produce a similar result. A little knowledge of anatomy, however, explains this circumstance. The artery is enclosed in a sheath, which so far protects it, and its elasticity yielding to the pressure of the bones, enables it to escape in a great majority of cases from the occurrence of this accident. The history of gangrene, as far as dissection enables us to judge of it, is this: the excessive action of the part closes the blood-vessels, and the blood contained in them becomes coagulated.

Experiment.

This is a curious circumstance, which I ascertained by an experiment made on an animal. It is a well-known fact in physiology, that if a quantity of blood be included in a living vessel between two ligatures, at the distance of two or three inches, this blood remains about three hours before it becomes coagulated. To ascertain whether, if blood were admitted into a dead vessel, from which the air was entirely excluded, it would coagulate as it would in a glass out of the body, I put a ligature on the jugular vein of an animal, and another ligature at the distance of two inches from the first; then, cutting through the end of the vein, I brought it externally to the skin, so that it hung out from the wound. Having ascertained that the blood coagulates in three hours and a quarter

in a living vessel, I took off the ligature from the dead vessel, and found that in ten minutes the blood had coagulated as firmly as it would in a vessel into which a person had been bleeding. In a dead blood-vessel, therefore, the blood becomes coagulated just as it would in a vessel out of the body. If you attempt to inject a part after gangrene, the injection will not enter the vessel. There is a specimen on the table (Sir Astley exhibited the specimen,) of a gangrenous limb, where you may perceive that the injection has entered only as far as the part at which gangrene has commenced. Such is the state of parts under gangrene. They can never be recovered, because living blood can never again circulate in them.

The subject next in order is the treatment of gangrene; but as I intend to occupy a little of your time this evening by a very curious experiment, I shall defer the consideration of that subject to the next lecture. I have something to say to you, also, gentlemen, on another subject. In the course of these lectures, I have always considered it my duty to direct your attention to what is going forward in the hospitals, and to illustrate every subject, as far as possible, by a reference to cases which are actually under your inspection.

Singular Case of Anastomosis.

A short time ago, I amputated a limb in the other hospital, in a case of aneurism, which is extremely curious, and to which I am not sure that there ever has been a parallel. Some months ago, a man underwent the operation for aneurism; the femoral artery was tied; shortly after, the pulsation disappeared, and he was soon after supposed to be cured of the aneurism, and discharged. He returned to his work; but soon after a swelling arose in the ham, without pulsation. The swelling subsided in consequence of rest: but a few weeks ago, while the man was at labour, the swelling returned with great pain, which increased during the time he was in the hospital; and, as there was no prospect of his recovering a useful limb, amputation was resorted to. In this case, I found the femoral artery, below the place to which the ligature had been applied, was conveying blood. As it was impossible that the femoral artery could be pervious, the blood must have been conveyed

by anastomosis. It does now and then happen, that a blood-vessel will arise from the artery just above the ligature, and pass into the artery immediately below the ligature; by which means the circulation is produced. There is a beautiful specimen in the collection, where the brachial artery had been tied, and the blood was conveyed by a vessel not more than three inches in length, from the part just above to the part just below the ligature. This now and then occurs after the operation for aneurism, anastomosis happening where it is not usually found, from a short vessel running from one portion of the artery to the other.

Reed's Syringe.

The other subject to which I mean to call your attention, is the experiment which I made on an animal last Friday, in the other hospital. This experiment, gentlemen, delighted me; I do not know that I have ever experienced greater pleasure in my life than I felt in going home from the hospital on that day. With respect to antidotes against the effects of poison, it is well known that they are, in a great degree useless. It is impossible, for instance, to get rid of arsenic from the stomach by any remedy that can be administered. It is doubtful whether any man ever recovered from the effects of that poison by means of an antidote. So with respect to opium; when it is taken into the stomach in such large quantities that vomiting cannot be excited, the patient cannot be relieved by the exhibition of medicine; for where is the antidote against the effects of opium?

Case.

A few weeks ago, a nurse in this hospital died in consequence of having swallowed opium. No relief was exhibited to her; but can it be said, after what we saw on Friday, that no relief *could* have been administered to her? A short time since, a patient died in the other hospital, under similar circumstances; the quantity of opium taken being so large, that vomiting could not be excited by any means which were employed.

Case.

I was myself, on one occasion, called to a young lady, who had taken two ounces of the tincture of opium. It was ten o'clock in the morning when I first saw her; she was then comatose. I tried to excite vomiting by the sulphate of copper, giving it in as large doses

as I could venture to administer; which I have sometimes known to succeed when all other means have proved ineffectual. It was, however, unavailing in this case, and I sat by this young lady from ten o'clock in the morning, until eight in the evening, watching the regular process to death, without being able to administer to her the least relief.

Let me ask you then, gentlemen, whether an experiment of this kind is not in the highest degree interesting, and whether we are not infinitely indebted to the man who first suggested the means of administering relief, under such afflicting circumstances? I am happy to tell you, that the gentleman to whom we are indebted for this suggestion is now present: that he is ready to have the experiment made upon himself, and that so confident is he of the success with which it may be applied, that he would have no objection, if I could permit it, to take a large quantity of the tincture of opium, in your presence, this evening. I suggested, however, that a little coloured water would answer all the purposes of illustrating the use of the instrument. The syringe, which was brought to me the other day by a very ingenious man, Mr. Reed, of Kent, is entirely a new invention, nor do I think the merit of that individual in the least degree diminished by what I have since learned. Its advantages.

The application of the syringe to the stomach, in cases of poisoning, is due to a gentleman whose name I shall presently mention. Mr. Reed's syringe is a new contrivance, which has been formed upon a principle in hydraulics, (first applied, I believe, by Mr. Bramah,) and which is capable of increasing the force of the instrument to the greatest possible degree. To give you an idea of its force: if I were to stand on a piece of wood, and the wood were surrounded by any thing which would prevent the escape of the water, the force of the syringe is capable of raising me from the ground. I do not wish to commit myself by any observations on a subject with which I do not pretend to be particularly conversant; but I believe, gentlemen, the principle is this: when a fluid contained in a vessel, having a large diameter, is Its application.

thrown into one of very small diameter, the result is, an exceedingly great accumulation of force.

Hydraulic Power.

Thus we see that piles which are driven into the beds of rivers, by the force of immense weights acting upon them, are raised by the admission of a very small quantity of water under them, upon the principles which I have just stated. Mr. Reed's syringe is formed upon this principle, and the valves are, besides, different from any which had been previously employed in similar instruments.

First applied.

With respect to the medical application of the syringe, however, for the purpose of removing poisons from the stomach, we are indebted for it to Mr. Jukes, a surgeon at Pimlico, who published an account of it in the *Medical and Physical Journal* for November, 1822, p. 285; and a further account in the same journal for June, 1823. Mr. Jukes originally employed a gum-elastic bottle to be applied to the tube; but the improvemnt of a syringe was suggested by Mr. Bush, of Frome.

LECTURE XV.

TREATMENT OF GANGRENE.

In the last lecture we defined gangrene as a partial death; we described to you the symptoms which attended it, when it was the result of high and active inflammation, and when it was the result of a low degree of heat.

To prevent Gangrene.

We shall now proceed to consider the treatment which is usually employed to prevent gangrene, and to prevent the sloughing process. You must endeavour to soothe the parts by the application of leeches, with a view of checking the excess of action. It generally happens, in cases of gangrene, that the body will not bear any considerable degree of depletion; but local depletion, by

means of leeches, may be safely resorted to. Thus, in compound fracture of the leg, for instance, gangrene may be prevented by the application of leeches, when it would not be equally safe to take blood from the arm. Soothing applications, such as poppy fomentations and poppy poultices, should be employed to subdue the excessive action which threatens the destruction of the life of the part. It will be necessary, at the same time, to attend to the constitutional treatment of the patient.

General bleeding.

In this metropolis, it is seldom safe to take blood from the arm of patients to prevent gangrene. In the country, a different practice may be pursued; and it will frequently be necessary to take away blood in erysipelas, and other cases, in which we cannot and dare not deplete in town, where the constitution of patients is broken by intemperance, or enfeebled by deteriorated air. When you take away blood, however, to prevent gangrene, do not take more than eight or ten ounces, lest the vigour of the circulation, and consequently the nervous powers of the constitution, should be too much diminished.

Constitutional Remedies.

Two or three grains of calomel should be given at night, with a view of restoring the defective secretions of the intestinal canal and the liver; and the liquor ammoniæ acetis, with a few drops of the tincture of opium, should be given several times in the day. By the calomel you restore the secretions; and by the opium you tranquillize the system, and diminish the irritability which leads to the destruction of the life of the parts. Do not begin by stimulating the constitution too much, in cases of gangrene. The effect of opium may, in some respects, be similar to that of taking a stimulus into the system, but it is by diminishing excessive action, at the same time that it increases the strength of the body, that opium becomes so valuable a medicine in these cases. The best means, therefore, of preventing grangrene, are to restore the secretions by calomel, and to diminish irritability by opium, and, in some cases, by taking away very small quantities of blood.

Benumbed, or frozen parts.

If the gangrene arise from the application of cold, the treatment must be different. In these cases, the action of the parts is feeble

from the diminution of nervous power, and it will be proper to restore it to a healthy state by stimulants of the most gentle kind. For this purpose, the best application is the camphorated spirit of wine, accompanied with gentle friction. If you are called to a patient whose feet are benumbed by the application of cold, you must sit by his bedside, pour the camphorated spirit into your hand, and rub it on his feet with the utmost possible gentleness, so that the part may not be irritated by violent friction.

When the first effects of cold are removed, it will be proper to apply poultices to the part. The poultices must be cold, for warm applications to the part are to be carefully avoided. One of the most valuable of our nobility died of gangrene from an imprudence in this respect. He was out shooting in December last, and his feet having become benumbed, he put them into warm water as soon as he returned home. The consequence was, that his toe became gangrenous; the gangrene soon extended to the other foot, and he died from its effects. When parts are frost-bitten in colder climates, you are aware that the common practice is to restore the circulation by rubbing them with snow.

So much for the prevention of gangrene.

When Gangrene has commenced

But as soon as gangrene has commenced, it will be necessary to apply a gentle stimulus to the parts, with a view of supporting the action of the surrounding parts, which are threatened with the destruction of life. The application which I have found to be most uniformly successful in such cases, is the poultice of stale beer grounds. The stale beer grounds, which may be obtained in any public-house, should be mixed with linseed meal, and a poultice formed of them, which will produce a gentle and beneficial stimulus to the part, and prevent the gangrene from spreading to the surrounding skin. Spirituous fomentations are also of use for the same purpose. At the same time that this local treatment is employed, means must be taken to support the constitution, which is debilitated by excessive action.

Ammonia, &c.

The best mode of supporting the constitution is by the exhibition of ammonia mixed with opium. From seven to ten grains of the

carbonate of ammonia, with twenty drops, or half a drachm, of the tincture of opium, should be taken two or three times a-day, or even more frequently, as once every four hours. This plan will generally prevent the extension of gangrene. Bark was formerly extolled, as possessing great virtue in cases of gangrene; but it is doubtful whether it does not do as much harm as good. For the first two or three days the patient feels comfortable, and his health is improved by its exhibition; but, after a short time, his stomach becomes loaded and oppressed. It first makes him costive, and then purges; and, after a little time, we are obliged to suspend its use. I am much disposed to try, in these cases, the new form of this medicine, which agrees so well with the stomach; I allude to the sulphate of quinine. It is my intention to give it a full trial, in the first case of gangrene which I meet with; and I recommend you to try it yourselves in the cases of gangrene which may come under your observation. An excellent medicine used in the other hospital, is a bolus of five grains of the carbonate of ammonia, with ten grains of musk, given every four hours. I have seen this medicine produce the best effects in sloughing sores in the foul wards, and in gangrenous sores, where the gangrene was much disposed to spread. The musk has the effect of keeping up the stimulus of the ammonia, which is apt to subside after a few hours, when the ammonia is exhibited alone. A port wine poultice is an admirable application in these cases. I mentioned to you, a few days ago, the case of a girl in the other hospital, who had a gangrenous sore in the pudendum, where a great variety of applications had been tried, without any beneficial result. At last a port wine poultice was applied, and with such immediate good effects, that, though I had before despaired of her life, the last time I saw her the sore was brought into such a healthy state, that there are great hopes entertained of her recovery.

Quinine.

Ammonia and Musk.

Port-wine.

Applications of turpentine are often of use in these cases, for the purpose of stimulating the parts. After great want of circulation in any part, from the course of the blood having been arrested, sloughing sores are very apt to occur. Thus, after the operation

Turpentine.

of tying the femoral artery, if the limb be suffered to rest in the same position for a considerable time, a small gangrenous spot frequently appears. In such cases, the spirit of turpentine is the best application. Yeast is often applied with the same view. A lotion much used in the other hospital, for this purpose, is the formula which used to be called the epithema lythargyri acetatis, but now called the epithema plumbi subacetatis.

The following is the mode of preparing it:—

℞ Confect. Ros. ℥j
Mel. Rosæ } ss
Tinct. Opii. }
Liq. Plumbi Subacet. ℥iij. M.

This is an application which accords extremely well with limbs in a state of gangrene, when the dead are separating from the living parts: it is a very useful application then in gangrene. During the sloughing process, the nitric acid is the best application that can be used: when the gangrene stops, and the line of demarcation is drawn, and the sloughing process is commencing, the nitric acid may be employed in the portion of fifty drops to a pint of water. I have seen very good effects from an application composed of vinegar and camphor mixture, about four ounces of the vinegar to twelve ounces of the camphor mixture; I have seen this of service when no other application had been used, as in the case of a gentleman at Peckham, whom I attended with Mr. A. These are the different modes of treatment for the prevention of gangrene, and the arresting of the sloughing process.

ON THE PROPRIETY OF AMPUTATION IN GANGRENE.

Propriety of amputating.

As to the propriety of amputation—there is no occasion in general for amputation in cases of gangrene when the sloughing process is going on, as you have an opportunity of seeing in the man at the other hospital, where nature has performed the operation herself, without any assistance; if the surgeon will be content to wait a short time, and the patient is disposed also, you will find that the parts will separate as well without, as with, an operation.

Now the old surgeons, who observed nature well, adopted the very same plan in their amputations as nature pursues in these cases; the skin separates the longest, the muscles next, and then the tendons, together with the bones, which are left considerably shorter than the rest, as you may observe from the specimen on the table. When bones ulcerate, the tendon soon separates, and the bones become covered in by skin and muscle; the limb, however, before me, was amputated. The cases in which you are called on to perform the operation of amputation are when the patient will not be able to sustain the shock to the constitution; then, gentlemen, if gangrene be going on in any part, or through the middle of the leg, by which the power of the constitution will be nearly destroyed, you may have recourse to an operation; but even here there will not always be occasion for it. You have an opportunity of seeing in the other hospital at present, in a case to which I have so often alluded, separation taking place above the centre of the leg; there is no necessity to amputate always under such circumstances, and you can give the patient a chance of his life, without resorting to it, if he dread the knife.

I say, gentlemen, *in constitutional gangrene* never amputate till the sloughing process has commenced, and healthy granulations are to be seen on the sore; for if an operation be performed, the parts will assume exactly the same appearance after as before it. It is curious to see how the loss of a slight quantity of blood will destroy life in these cases.

When I was a dresser at these hospitals, during my apprentice- Case.
ship, a case of sloughing opposite to the calf was brought in: Mr. Cline, my old master, on going round the wards, said to the dresser, that the projecting ends of the bone had better be removed. There were some granulations between the bones, which, in sawing them off, the dresser did not observe, and therefore cut through them; little hemorrhage ensued; no ligature was applied; yet, on the same night, the patient died. There was a case under the care of Mr. Foster, in the other hospital, on which he performed the operation of amputation; there was gangrene on one foot, a slight gangrene on the nose, and the other foot. The leg was amputated;

but the infection spread in the nose and foot, which, before the operation, were slightly gangrenous: then, gentlemen, it is proper to consider that amputation should never be performed till the constitution is in a sound state, and healthy granulations have appeared.

Gangrene from accident.

But with respect to *gangrene* from *defective action* or *accident*—When called to a person labouring under gangrene, arising from accident or pressure on some important vessel, amputation may be performed without the least hesitation.

Case

A girl was brought to this hospital, who, in endeavouring to reach something from the chimney-piece, trod on the fender, which turned over on its edge, and she fell backwards; there was a compound dislocation of the elbow-joint, together with a wound of the brachial artery; this vessel was tied by the dresser, hemorrhage was arrested, gangrene soon afterwards appeared in the finger, when, nine days from the accident, the operation of amputation was performed above the elbow-joint, and the patient did extremely well.

Case.

A man was brought to Guy's, from Woolwich, with popliteal aneurism: the aneurism had acquired a great size; there was a gangrenous state of the limb below, so that it was thought there was no chance of saving his life by tying the artery; therefore amputation was performed. Before the operation the pulse was from 120 to 130. In the evening, after the removal of the limb, I sent Mr. Callaway, who was my apprentice at that time, to see how the patient was doing; he found that the pulse had fallen to 90; and no stump that ever came under my care turned out more favourably. Thus, instead of increasing the irritability of the constitution, the source of the irritation being removed, the health of the patient became improved.

ON GANGRENE IN OLD PERSONS.

Cause of gangrene

We often find old persons afflicted with gangrene, from very slight causes, and particularly those who are tall The heart

being naturally weakened by age, the circulation becomes extremely languid in the feet; hence mortification of the toes ensues.

The appearances which the part assumes are these:—at first it is red and painful; the person, thinking little of the matter, puts upon the affected part a piece of linen; in a few days the cuticle comes off, and there issues from the surface a sanious discharge; red streaks are now seen passing from different parts of the foot up the leg; and the glands in the groin often undergo considerable inflammation and enlargement; all the absorbent vessels of the foot becoming inflamed, produce universal redness of the diseased member. Soon after this the gangrene begins to extend, destroys the whole of the foot, and passes to the upper part of the leg, where it usually stops, as it seldom reaches the thigh; the constitution becomes considerably influenced; there is some degree of fever, and the cheeks are of a florid red colour. Its characters.

This gangrene will not commonly destroy life, if attention be paid to the patient. It generally arises from ossification of the arteries—not of the large vessels, but of the small. These losing their elasticity, combined with a debilitated action of the heart, give rise to the disease of which I am now speaking. The earthy matter is sometimes deposited in great quantities in the large vessels; and here *(showing a preparation)* is an example, in which the deposition of earthy substance has rendered the principal arteries of the leg, and even part of the femoral artery, impervious. Gangrene from ossific deposits.

I recollect some time ago a very intelligent surgeon telling me, that he thought a certain nobleman, whom he was at that time attending, had ossification of the arteries of the leg, and that it would some day give rise to gangrene—of which gangrene his Lordship has since died. Case.

Where ossification of the blood-vessels exists, very slight causes will give rise to gangrene. A gentleman of the city, in cutting a toe-nail, carried the knife too far, and cut the quick, as it is termed: the wound soon became gangrenous and black, and in the sequel he died. Case.

Case.

I attended a gentleman, an old surgeon, who, for the purpose of getting rid of a bunnion, had (most foolishly) put a lancet into it; gangrene followed, and he died.

Case

I was lately sent for by Mr. Holt, surgeon, of Tottenham, to see a gentleman, who, when cutting a corn, had carried the incision a little too far, so as to produce bleeding: gangrene here likewise took place. Old persons must, therefore, be cautious; for life being almost exhausted very little will extinguish it.

Treatment.

A poultice, composed of port wine and oatmeal, will generally be found the best *local* application: and your *internal* remedy should consist of opium combined with ammonia. You must not expect that these cases will always recover. I have known, however, a single toe, a whole set, and even the entire foot, to slough, and yet the patient do well. In these cases you must never amputate—whether there be healthy granulations or not, do not amputate; for as surely as you do, mortification of the stump will supervene.*

The next subject of which I shall speak is

CARBUNCLE.

Of this I shall have but little to say, as many of the foregoing observations are equally applicable here.

Symptoms of Carbuncle.

When carbuncle is about to take place in any part, it is generally preceded by pain, and at first a swelling of considerable hardness; this is occasioned by the adhesive inflammation: the surface of the tumour then assumes a livid redness and a spongy soft feel; little ulcers now form in the skin, which, from their number, give it a sieve-like appearance, so numerous are the orifices; from these a white discharge passes—this fluid resembles flour and water mixed together: and a man who has seen much of carbuncle, knows the nature of the disease instantly upon seeing the discharge. When the little openings are all formed into one, the dead cellular membrane begins to escape, for it previously cannot do so, from the smallness of the apertures.

* The Chlorurets of Lime and Soda have been found of essential service, at least as disinfecting agents.—L.

In gangrene of the extremities there is not this mechanical obstruction to the sloughing of the dead part. And though gangrene is generally difficult to cure, yet carbuncle usually does well, except when situated on the head or neck. Though persons will recover from carbuncles of an enormous size upon the back, yet very small ones on the head or neck will often destroy life; indeed I never saw a patient who recovered from carbuncle upon the head; in these cases there is effusion between the tunica arachnoides and pia matter. The inflammation which attends fistula in ano will sometimes destroy the cellular membrane of the neighbouring parts, thereby occasioning an enormous quantity of the anus to slough, and yet the patient shall do well.

Treatment.—The peculiar treatment of carbuncle consists in making upon the surface of the swelling, at an early period of the disease, a large crucial incision, for the purpose of affording the deadened parts an opportunity of escaping; then apply the port wine poultice, and give the patient such stimulants as will tend to increase the vigour of his constitution, and here we shall again find opium and ammonia our sheet anchors. Treatment.

ON ERYSIPELAS.

Inflammation of the skin is generally extensive. Why? In consequence of the surface being unbroken. Thus, when the pleura or peritoneum is attacked by inflammation, the whole of these membranes usually become affected by it; and also when erysipelatous. Erysipelas.

Inflammation invades the skin, it is not uncommon to see it run from one part to another, till half the body is covered by it. Sometimes it is ushered in by fever, and sometimes not. Certain constitutions are sooner affected by it than others, and often its effects appear to be entirely local. But unquestionably it affects the constitution more frequently than otherwise. Its seat.

Its characteristic appearances are, a florid skin, with vesicles containing a secretion of an amber colour under the raised cuticle. Characteristic marks.

It is seldom that the skin suppurates in these cases; the cellular membrane, however, occasionally does. It is very common for erysipelatous inflammation to terminate in gangrene. You must not consider all cases of inflamed skin erysipelas. I have often seen cases treated as such, where it would have been right to deplete. The best characteristic sign is its vesicular appearance: and this constitutes a specific difference between it and common inflammation.

Frequently on the head.

The head seems to be more commonly affected by it than any other part; it often succeeds the most trifling injury of the scalp: and, like carbuncle, when it occurs in this situation, generally destroys life. I had the misfortune to lose a lady of considerable consequence from its effects, where it came on after the removal of a small encysted tumour from the forehead. It made its appearance three days after the operation, and all the exertions of Dr. Baillie, and myself, were unable to arrest its progress. Thus a trifling operation on the scalp destroyed life, in consequence of having been succeeded by erysipelatous inflammation: but I shall speak of this more particularly afterwards, for I have some doubts whether inflammations on the head, following slight wounds, be truly erysipelatous or not.

After a person has once had this disease, he is very subject to it again; and some persons appear to be predisposed to its formation.

The influence of season.

It generally makes its appearance in spring and autumn, but seldom in winter, and not very often in summer. Whatever renders the body irritable predisposes to erysipelas. In hospital practice, surgeons were formerly exceedingly afraid to operate in autumn and spring; for it has often happened that the stimulating effects of adhesive plaster have produced this disease, and have led to the death of the patient. Sometimes it is epidemic, and sometimes contagious.

Treatment.

Treatment of Erysipelas.—In this town the following plan is pursued, and which, *for London*, is undoubtedly the best:—You at first give calomel, for the purpose of restoring the secretions of the

liver and intestines: then allow a generous diet, and administer the ordinary tonics; or from what I have witnessed, I would advise you to try the sulphate of quinine; it is a most powerful tonic, excites in the stomach a genial warmth, and will often remain in that organ when bark will not.

Dr. Marcet, now deceased, but late a physician of Guy's, endeavoured to ascertain whether the antiphlogistic or tonic mode of treatment was best for this disease; therefore he put two persons, having erysipelas, into adjoining beds; to one of whom were given tonics and a generous diet; to the other, salines and low diet; blood likewise was abstracted from the latter; they both recovered, the former rapidly, while the latter lingered in a debilitated state for a very considerable period. Experiment.

You will find, where the erysipelas attacks the lower orders of this town, who weaken their constitutions by the excessive use of ardent spirits, that gin may be sometimes advantageously employed as a remedy, at once being the evil and its cure; the two last cases of this disease which I saw in the other hospital, prove the truth of what I am now saying: a man had erysipelas dreadfully severe; his head swollen to an enormous size, and his recovery, by every person, thought impossible. It was discovered, one day, that his wife brought him some gin. He declared that he was better from having drunk it, was consequently permitted its continuance, and, to the astonishment of all, he rapidly got well. Stimulant. Case.

Not six weeks after this, there was another man, similarly circumstanced, brought into the same ward; and having, from the result of the above case, formed a high opinion of gin, I directed the sister to give it here also; and really this patient recovered as speedily as the former. But it is in the debility consequent upon the first stage of the disease that this plan is to be resorted to. The local treatment of erysipelas consists in the application of camphorated spirits of wine in the first stages. When the vesications are about to break, or are broken, powder the part with starch, and if gangrene be produced, apply a port

wine poultice, or the nitrous acid, a lotion, in the proportion of drachm of the acid to a quart of water.*

LECTURE XVI.

ON INJURIES OF THE HEAD.

Brief account of the nervous system.

BEFORE I proceed to mention these, I will give you a brief account of the nervous system; a correct knowledge of which, however, can only be acquired by assiduity in the dissecting room. The nervous system is composed of the following parts, *viz.* brain (which is divided into cerebrum, cerebellum, and medulla oblongata), medulla spinalis, and two sets of nerves—one set issuing from the brain, and the other from the medulla spinalis. Beside these, there is also the grand sympathetic nerve, which may be said to form a system in itself, it communicates with most of the nerves of the brain, and with those of the spinal marrow; it forms by its branches a large ganglion, or several ganglia, called the semilunar, situated behind the stomach, and a plexus proceeds from this, which distributes branches to the greater part of the abdominal viscera.

Its distribution.

The nerves are freely distributed to every part of the human frame, and are the means by which all voluntary and involuntary motions are maintained. It is impossible that a mere description of the nervous system, in this place, however minute it might be, could make you sufficiently acquainted with its anatomy; for this can only be obtained by the most careful and attentive examination of the dead body. It is necessary, however, for you, at this moment, to bear in mind, that an immediate communication exists between the stomach and brain, by means of the eighth pair of nerves, or par vagum; for unless you do this, it is probable that an important symptom, which I shall presently mention, attendant on injuries of

* If no vesication have taken place, I have always found a strong solution of nitrate of silver, applied as a lotion, then powdered with flour, a most effectual remedy.—L

the brain, will be but imperfectly understood. There is also another circumstance connected with the brain, to which I wish particularly to direct your attention, *viz.* its being the vehicle of the mind; or, rather, I might say, the medium through which the mind is communicated. The influence of the brain on the mind, and *vice versâ*, will be amply demonstrated to you as I proceed.

Symptoms.

Now, when the brain receives an injury, the symptoms stated to be the result of that injury are, general loss of sense and volition, if the injury be considerable; but if not so severe, some portion of sense and volition will remain; for example, when you are called to the bed-side of a person thus situated, you find him to be what is termed comatose. The stomach is affected through the medium of the par vagum or eighth pair of nerves; and from the general communication between the grand sympathetic nerve, and those of the brain, and spinal marrow, the functions of the heart and abdominal viscera become affected. If you speak sharply to him, he becomes roused for the moment, mumbles some brief answer to you, again lies down, and relapses into his former sleepy state: thus you observe partial mental faculties and volition still remain. This state you should minutely note, as it will greatly assist you in your after diagnosis; and you must be upon your guard that you are not deceived here; for a man in this condition very much resembles one in a state of intoxication; and this similitude often proves exceedingly harassing to the surgeon. He is probably sent for to a person who, it is stated, has received a severe injury of the head. He finds him with a very severe laceration of the scalp, together with stupor, and sometimes even stertorous breathing. Not knowing that the individual was intoxicated at the time of receiving the injury, the surgeon attributes the above symptoms to concussion or compression, when, after a few hours, the person recovers from his drunken fit, and it becomes apparent that he received no other mischief than a wound in the scalp.

Effects on the abdominal viscera.

In addition to loss of sense and motion, the fæces involuntarily pass off, from the sphincter ani losing its retentive power through the sympathetic influence of the great sympathetic nerve—the

Bladder.

voluntary power of the bladder becomes for the time extinct—the urine is retained, and you are obliged to pass a catheter for its removal, at the very time when the escape of the fæces cannot be controlled. But the involuntary functions of no organ are so soon affected by injuries of the brain as those of the stomach; this arises from the connexion before explained to you; vomiting, therefore, is one of the first symptoms, though the fæces pass involuntarily, yet there is such torpor of the intestinal canal that purgatives will not easily excite action, and there will be found considerable difficulty in procuring evacuations; the pulse is said to beat laboriously; for the heart being affected, it cannot readily get rid of its contents. The pulse, however, is not slow unless the body be at rest: for upon the slightest exertion it becomes exceedingly quick: the pupils are dilated, and there is sometimes bleeding from the nose, which, when the patient has been kept lying on his back, often occasions vomiting of blood; when the injury has extended to the basis of the skull, producing fracture there, it is generally attended with bleeding from the ears. These cases are very dangerous, and persons usually fall victims to them. In addition to the symptoms already enumerated, there is often partial paralysis, or hemiplegia; squinting is occasionally produced; the natural direction of one or both eyes becoming changed; permanent, partial, or total aberration of the mental faculties may also be added to the consequences already enumerated, arising from injuries of the brain.

The involuntary functions.

Pulse.

Paralysis or Hemiplegia.

Concussion and Compression defined.

When asked to explain the difference between concussion and compression, you answer concussion is simply a shock which the brain has received, more or less severe, attended with laceration or not, and compression arises from either a depressed portion of bone, the extravasation of blood, or the formation of matter; and from whichever of these it springs, the symptoms will be the same.

Symptoms of concussion.

In describing the symptoms and treatment of these diseases more particularly, I will first begin with *Concussion*. When called to a person whom you find in a state of stupefaction, but not to a great degree; regular pulse, tranquil and regular breathing; and the accident has existed some hours, you will generally be justified in

pronouncing that the injury has been trifling: but when the individual has been first seized with vomiting, is incapable of using any muscular power from loss of nervous influence; a total aberration of the mental faculties, with intermittent pulse and breathing, these will be found the diagnostic symptoms of severe injury, and the case a dangerous one. In simple concussion, where the derangement is not so extensive as that just described, and where the patient, upon being spoken to, raises himself, as if awoke from a sound sleep, and where some power of volition still remains, you will find one of the best diagnostic symptoms to be the accelerated action of the pulse upon the patient exerting himself; a man in this state with a pulse at 70, on being raised, or attempting to walk, will have it inordinately quickened, it will instantly beat 130 in a minute; this is a never failing symptom, and where the patient can be made to exert himself at all, will be found a sure characteristic of the disease. There is also in these cases a greater action of the carotids than in health; they beat more violently, though not more quickly, if the patient be at rest; if asked what are the best marked symptoms of concussion, I should say this increased motion of the carotids; the apparent tranquil sleep; the instantaneous relapse to that state, after having been roused; the remarkable excitement of the pulse upon using exertion, and insensibility having immediately followed the injury.

Its effect on the auditory organs.

The diminution of the operations of the mind is often so great in concussion, even where considerable voluntary motion remains, that you cannot, even by hallooing as loudly as you are capable, get any other answer from your patient, than 'eh!' delivered in a gruff under-tone. I have known several very curious circumstances of this kind;—one case was that of a gentleman who had met with an injury of the head, by which concussion had been produced—every endeavour to get a word from him was ineffectual; yet at one period, when the attendants were all absent, he got out of bed, bolted the door, made water, and returned to bed again, in the same manner as though he had been in perfect health: when the servant went back, he found the door fastened; all their knocking was unavailing;

they were obliged to break it open, and then could not procure from him a single word. Indeed, I do not believe the noise of an earthquake would have succeeded in rousing him from his lethargy; yet he could get out of bed, pass his urine, and adopt his ordinary habit of delicacy, by bolting the door. I have caught a man, when labouring under the effects of concussion, with his feet in a chamber-pot, and by the action of his hands, it was evident that he was trying to throw water over his legs; upon the servant going into the room of the same individual some days after, he was found to be attempting to shave himself, and having no lather, he substituted a pot of spermaceti ointment, which he had brushed all over his face.

Mind, memory and language.

I suppose you have all heard of the extraordinary change which the memory sometimes undergoes from the effects of concussion. The first story of this kind that I ever heard was from Mr. Cline. A man was taken to Guy's, in a state of insensibility, in which condition he remained for some time, but at length recovered; and when he did so, no person in the hospital could understand his language; a milk-woman happening to go into the ward one day, heard him, and discovered that he was speaking Welch; he told her that he knew English well before the accident; but, after it, all knowledge of that language was obliterated from his mind. It had been recently acquired; the impression was less strong, and consequently the more easily effaced.

Case.

I witnessed a similar circumstance in the case of a German, who was a sugar-baker in this town, and who had compression of the brain, arising not from any injury by violence, but from pressure in consequence of the formation of matter. This man could speak English extremely well before the compression; but as the compression increased from the accumulation of matter, he lost his English entirely, and I could only communicate with him through the medium of an interpreter. At last he lost the power of speaking even in his native language, and he died in consequence of the accumulation of matter.

Intellectual aberration.

It is curious to observe the gradual change which takes place in the intellectual faculties, as alterations occur in the brain; and the

gradual diminution of ideas which have been more recently acquired, until at length they become totally obliterated. Old persons are observed to be fond of relating anecdotes of their youth, forgetting incidents of more recent occurrence; and the change which takes place in the intellect, from injuries of the brain, is very similar to the effects of age. The patient becomes, as it were, suddenly old, loses impressions of a recent date, and is sensible only of those which he has received in his earlier years. Such is the state of mind very frequently produced by compression of the brain.

Concussion.

With respect to the state of the brain, under concussion, when the concussion is not extremely violent, there is merely a change in the circulation of the brain.

Its effects.

A sudden shock will so far disturb the circulation of this organ, as to produce diminution of the powers of the mind, as well as to impair the functions of the body. I shall have occasion to mention to you a most extraordinary case, in which the functions of the mind were suspended from an interruption of circulation in the brain, for upwards of thirteen months; the patient having, as it were, drunk of the cup of Lethe during all that period. Any change of the circulation in the brain alters, in some degree, the powers of mind and body; but if the agitation be very considerable, the powers of the mind will be for a time suspended. Thus, when a person is said to be stunned, there is a sudden alteration in the circulation in the brain, and a corresponding loss of sensibility; but when the circulation is restored, by the means which I shall presently point out to you, the powers of the mind return with those of the body. When the concussion is very violent, a lesion of the brain takes place; but when it is slight, no appearances can be discovered on dissection which indicate any alteration of structure.

Examination post mortem.

A person may die from another injury, accompanied with concussion; and on examination after death, not the least alteration may be found in the brain. This is not the case, however, where the concussion is violent. I have before me a great number of preparations, from the brains of patients who have died of concussion,

in most of which that organ was considerably lacerated, and some extravasation of blood is observable within the brain. (Several beautiful specimens of lacerated brain, accompanied with extravasation of blood, were exhibited to the class.) These specimens show the effects produced by severe concussion.

Case.

I remember a case of a gentleman, an intimate friend of the late Lord Nelson, who fell from his horse at the corner of St. Thomas's-street, in the Borough. He was immediately taken to Guy's Hospital, where he was found to have all the symptoms of concussion, and he was treated in the usual manner. On examination of the body, after death, (for he died eight days after the accident,) the brain was found to be lacerated in several places, and considerable extravasation of blood had taken place. In general, therefore, when the concussion is slight, there will be only an alteration of circulation in the brain; but when it is severe, there will be laceration, accompanied with extravasation of blood, and the symptoms will be found to run into those of compression.

Case.

The first case in which I ever saw the brain lacerated from concussion, was one which occurred at the other hospital, in the first year of my apprenticeship, when I was a dresser to Mr. Chandler. As this was the first case of the kind I had seen, I preserved a portion of the brain. The patient had lost the power of speech from a blow on the head; but there was no appearance of any wound or injury to the skull. Mr. Chandler attributed the loss of speech to concussion. On examination of the body after death, it was found that the anterior lobe of the cerebrum was torn, the first effect of which injury was the loss of the power of utterance, or rather a paralysis of the muscles, which deprived him of the power of speech, and subsequently compression and inflammation, of which he died.

Concussion is of two grades.

When you are asked, then, as to the effects of concussion, as they may be collected from the appearances on dissection, you will answer, that when the concussion is slight, it is merely an agitation of the brain, by which the circulation is altered; but when it is severe, the brain itself suffers laceration, which laceration

is accompanied with extravasation of blood. By the knowledge of these facts we are led, without difficulty, to the principles of treatment.

Treatment of Concussion.—The great danger which we have to guard against, in the treatment of concussion, is inflammation of the brain. This principle must direct our practice: and in order to prevent inflammation, we must take away a very considerable quantity of blood. Treatment.

By bleeding largely at first, we not only remove existing inflammation, but we prevent that which would otherwise occur. This practice, however, may be carried to excess. There are some persons who say you cannot bleed too much in these cases; but such an assertion only proves their want of understanding. You must regulate your conduct by the symptoms; observe whether there be any hardness in your patient's pulse, and whether he complains of pain in the head, if he have still the power of complaining: watch your patient with the greatest possible anxiety; visit him at least three times a-day, and if you find any hardness of the pulse supervening, after the first copious bleeding, take away a tea-cupful of blood; but do not go on bleeding him largely, for you would by this means reduce the strength of your patient too much, and prevent the reparative process of nature. It is necessary that there should be a slight degree of inflammation, for without this, the reparative process cannot go on, and the patient cannot recover; but it will be your duty to keep this inflammation within due bounds. I shall mention a case in which fatal consequences ensued from the error committed by the surgeon in bleeding his patient to such excess, that the slightest degree of inflammation necessary to the process of adhesion was removed, and the reparative process of nature consequently prevented. Bleeding.

In these lectures, gentlemen, I feel it to be my duty to describe to you surgery as it is—and not in the glowing colours in which it is painted to you in books. You must be content to practise surgery as it is—not as is sometimes fallaciously represented Admonition.

to you. I am most anxious that you should omit nothing which may contribute to increase your professional skill, and enable you to afford the greatest possible sum of relief to the sufferings of your patients; but they who blazon forth our profession as one which is attended with undeviating success, are only deceiving you. You must hear the untoward cases of your profession, as well as those of which the issue is favourable, in order to form a correct judgment in your minds what your profession really is. It is for these reasons, gentlemen, that I shall never hesitate, *coute qui coute*, to detail to you, and perhaps to the public, those cases which have terminated unfavourably. I have a duty to perform, and I shall never shrink from the discharge of it. It is by detailing to you the unfavourable, as well as the favourable cases, that I can alone perform that duty; for it is by such a course alone that I can point out to you the rocks which you are to avoid, as well as the havens in which you are to endeavour to anchor. The case to which I last alluded was one of concussion, accompanied with slight laceration of the brain, which occurred in the other hospital.

Case of over depletion.

The gentleman, under whose care the patient was, thought it right to bleed him, and that he could not bleed him too largely. He accordingly bled, not only from day to day, but twice a day. The consequence of this mode of treatment was, that the patient became perfectly pale, was in a state of considerable dejection, not of the mind, but of the powers of the body, and died without any symptoms of inflammation, ten days after the injury.

Examination.

On examination of the body, it was found that there was a slight laceration of the brain, with some degree of extravasation of blood, but that not the slightest attempt had been made by nature to heal the wound. You are aware that the brain heals, like any other organ, by the process of adhesion; but in this case, the quantity of blood taken from the patient was so large, that the slight inflammation necessary to the adhesive process was removed, and the process of restoration consequently prevented. Still it is often necessary to take away blood, after the first large bleeding; but it

must be taken in small quantities, and you must watch the patient with the greatest possible anxiety, for the symptoms can alone regulate your practice.

Sometimes it is necessary to take away large quantities of blood. Case. I was called to a gentleman who had fallen from his horse, in riding to London. I found him insensible on my arrival. Mr. Constable, who attended him, had already bled him, but I judged it necessary to bleed him again largely, and I took blood in smaller quantities from him day after day, watching the pulse with the greatest anxiety, and bleeding him only so far as to reduce the hardness of the pulse without diminishing too much the powers of his body. The whole quantity of blood taken from this gentleman, by bleeding from the arm, opening the temporal artery, and the application of leeches, as far as this could be estimated, amounted to about two hundred and eight ounces of blood. One hundred and eighty ounces were taken from the arm: yet such was the hardness of the pulse, that at the last bleeding there was some degree of inflammation of the brain indicated.

Bleeding to be employed as a preventive.

You are to use bleeding as a means of preventing inflammation; but you are not to resort to it as a matter of course the moment you are called to a patient under concussion. A man falls from his horse, and the instant he is picked up from the ground, some surgeons think it necessary to take the lancet from their pocket. This conduct is quite irrational; for suppose the pulse could scarcely be felt at the wrist of the patient, and the surgeon were in such a case asked why he proceeded to bleed; what would his answer be? The probability is, that he would have no answer at all ready; or he would, perhaps, say that he bled him because the accident had brought a great quantity of blood to the brain, as if the shaking of the head could have any effect in producing a determination of blood to the brain. It is not with this view that we bleed in concussion, but in order to prevent inflammation. I have seen many a patient who would have died if a large quantity of blood had been taken at the time of the accident. This was the case with the gentleman who was attempting to shave himself, whose

symptoms I described to you this evening. When I first saw him, his pulse was scarcely perceptible. I took a little blood from the arm, and he was immediately seized with convulsions, like an epileptic fit, which I thought would have proved fatal. I closed the wound, and I would not, upon any account, have taken six ounces of blood from him at that moment.

Case.

Some time ago I saw a man, at the other hospital, who had received a blow on the head. He was pale and dejected, and his pulse could scarcely be felt I said to the dresser, you must not bleed this man at present; there is rather too little action than too much; wait till the pulse rises, and then bleed him. In the evening re-action took place; the pulse rose, and the dresser then very properly bled him. Inflammation was by this means prevented, and the man did well. The principle upon which you should act, gentlemen, is never to do any thing in your profession without a good reason, which, whatever may be the result of the case, will leave your conscience clear. A surgeon who bleeds without being able to assign any other reason than that his patient has received a blow, is not fit to practise his profession.

The next remedy I come to is emetics.

Emetics.

I must say that I have seen emetics of considerable use; the vomiting produced by them does good. I have always considered the efforts of nature to relieve herself, after injuries, salutary; and thus the vomiting which is excited in cases of concussion, acts beneficially by relieving the stomach of its contents, as the accident generally happens to persons in a state of intoxication; and also by propelling the blood to the brain, and thus restoring the powers of life. But the vomiting excited by nature restores the patient to his senses for a short time. He is sometimes relieved, but without continuing so long; he looks about, and lapses into his former state of aberration of mind, from which he had received merely a temporary relief. When emetics are exhibited as a remedy in concussion, there is only one thing that I fear from their use; when there is any extravasation of blood in the brain, or any tendency to apoplexy, then they should be employed with caution;

and it is on that account that I wait for three or four hours after the accident before I order them.

With respect to the exhibition of cathartics, the bowels should be kept open by calomel purges, followed by the infusion of senna, and sulphate of magnesia. The calomel should be given about two hours after the accident; and it will be useful to give to the patient at the same time a quantity of mild fluids to drink, as by this means a disposition to purging is kept up, counter-irritation is, as it were, produced, and the blood is drawn from the brain to the intestinal canal. Submuriate of mercury, with lemon-juice squeezed in water, should be given. Purgatives.

Perspiration on the surface of the body is very desirable, and for this purpose antimonials are employed. The pulv. Ipec. Com. (Dover's powder) is not generally used to produce moisture of the skin, on account of the opium it contains, which confounds the judgment, and prevents your seeing what are the effects of the opium, and what those of the disease; for opium produces the same disturbance to the brain as takes place in concussion; therefore it is not often employed. Diaphoretics.

Counter-irritation is of use, but not until other means have been resorted to; the object of blisters is to subdue the inflammation when other means have failed. I have known a patient, with pain in the head, sickness at the stomach, loss of strength, and throbbing of the carotids, who had been often relieved by blood-letting, for about two hours only after it was done. A person under such circumstances I have known benefitted by the application of a blister; on the principle not of increasing but subduing action, from an excess of which the ill consequences are to be feared. Counter irritants.

For the symptoms after concussion, the trephine used to be employed; but it now becomes a question whether it ever ought to be resorted to as a means of relief under those circumstances? To this I say, if you were to trephine, you ought to be trephined yourselves in turn. What will trephining do? Probably great harm, by disturbing the brain; and if not, no good can possibly result from it. Now for the proofs: first, that it does no good. Trephining.

Case.

Gentlemen, I never lecture to you but from the recollection of some case that has occurred to me. I was very intimate with a Mr. T. of Yarmouth, where I used to spend a good deal of time when a boy; after my apprenticeship was finished, I went down to this place, and I found Mr. T. labouring under the effects of concussion; his mind was not in the least affected: he had received a blow on the forehead from a bludgeon, and he was afterwards frequently seized with sickness at the stomach. I called on him: and when I went into the room, I said, I come to ask you how you are: in approaching me he was obliged to put his handkerchief to his mouth to prevent the contents of his stomach going over me. In his walks he had frequent vomitings; a relation who was at Yarmouth twelve months after this, said to him, that he had better have the trephine applied, and the portion of bone removed: to which he readily consented. After the operation his symptoms were not relieved; he remained just the same; or I should rather say that he was not relieved, for he did not continue long in the same state; he soon got worse and worse; his bowels became costive, the powers of the mind affected, and he died in consequence of the operation, though he had lived two years after the injury, before it was performed. Mr. B., now in Yarmouth, was living with him at the time, and he could tell more of the particulars than myself; but this I know, that he was not benefited by the operation, but injured by it. But for a more direct proof that it is dangerous: Dr. Farre told me that he knew a person who was subject to epileptic fits after concussion of the brain, and that he was extremely anxious to be trephined. The operation of trephining was performed, and he died soon afterwards.

Former practice.

Do not think, gentlemen, that I mention this as an uncommon case; but this used to be the plan adopted with almost all the patients admitted into these hospitals during my apprenticeship; they were all submitted to the operation; inflammation of the membranes of the brain supervened, and nearly all died; recovery being very rare. But do our patients now die from the effects of concussion? No; by bleeding and depletion we rarely lose a

Comparative view

patient; perhaps we have fallen into the contrary extreme. After the expiration of my apprenticeship at these hospitals, I went over to Paris to see the practice of Desault, at the Hôtel-Dieu; and there I found that never, under any circumstance whatever, did he trephine; and that he was more successful than those who were constantly doing it here. Trephining in concussion is now so completely abandoned, that in the last four years I do not know that I have performed it once: whilst thirty-five years ago I should have performed it five or six times a-year. But I believe that I have omitted one circumstance; and that is, to tell you to pay strict attention to the mind; excessive anxiety must be prevented; for if you suffer the mind to be disturbed, you do little or nothing towards the recovery. I was very much struck, about twelve months ago, with an instance of this: a boy was brought to me from the north of England, who had lost a portion of the skull just above the eye-brow; and I was asked (for it was for this purpose that I was consulted) what protection should be given to the denuded brain. On examining the brain, I distinctly perceived the pulsation was regular and slow; but at this time he was agitated by some means or other; directly the blood was sent with increased force to the brain, the pulsation became more violent; therefore, if you omit to keep the mind free from agitation, your other means will be unavailing.

Trephine abandoned.

Lastly, the treatment of children. As you cannot always bleed them from the arm, you must give the submurias hydrargyri (calomel) with mild drink, so as to purge them; leeches must be applied to the temples; you must open the jugular vein. For the symptoms after concussion, as pain in the head, or sickness at the stomach, you must make an incision through the scalp; put issues in; wash the head with spirits of wine and water, for this is better than any thing else I know; and use the shower-bath two or three times. These are the best means for giving power to the nervous system, and bringing the action of the brain into a healthy state. Sometimes I advise Ungt. lyttæ to be rubbed upon the head, and Pil. Hydr. and Extr. Colocynth. Comp. to be given. Electricity, in

Treatment of children.

nervous debility of an organ, is sometimes useful. In long continued pain of the head, I sometimes make an incision in the scalp, and open an issue, for the purpose of supporting external irritation; and have seen advantage arise from producing a slight exfoliation.

LECTURE XVII.

ON COMPRESSION OF THE BRAIN.

We have to consider the causes which give rise to it, its symptoms, and the treatment which it requires.

Symptoms.

When a person is labouring under compression of the brain, it is known by the breathing being stertorous, the pulse slow, and the pupils dilated; to which may be added the symptoms of concussion; when you then find a patient with the apoplectic stertor, slow pulse, dilated pupils, it will generally happen that the brain is compressed.

Causes.

The causes which produce compression are three:—1. Extravasation of blood; 2. Fracture with depression; 3. Formation of matter within the skull; these are the three causes which give rise to compression.

From extravasation.

We shall first consider compression when produced by extravasation. Now, gentlemen, when the brain is compressed by extravasated blood, the symptoms do not directly occur; the person at the time of the injury is often stunned; recovers himself, and a short time after falls into a comatose state, and then the apoplectic stertor begins.

Case.

I will relate to you a case to illustrate this:—A child was playing on a table, from which it fell on a stone floor, and received a severe blow on the head, which caused compression of the brain; the child appeared to recover at four in the afternoon, the time at which the accident occurred being one; pain still continued in the head, the child cried considerably; it went to bed about two hours

before its usual time; during the night, the servant was awoke by the apoplectic stertor of the child, which prevented her from sleeping; when she moved it, the child was not roused; she discovered that it was ill, alarmed the family, and at eight in the morning it died: it was found after death, that a considerable quantity of blood was extravasated in the brain.

The son of a most respectable merchant in the city was driving to his country house at a short distance from town, in a one-horse chaise, when he was thrown out, and pitched with his head to the ground; he was stunned by the fall: he recovered a little, but looked very pale; he said that he was much hurt; a friend who was with him drove him home; in the evening he felt very heavy, laying his head on his hand; symptoms of compression of the brain came on; ten *p.m.*, the family was alarmed; medical assistance called, but at two the following morning he died, all efforts to save him being unavailing. Case.

Extravasation with concussion renders the case of a different nature; then the symptoms of concussion, such as I described to you on a former evening, come on first, and the apoplectic stertors and other symptoms of compression succeed. Now for a case:— Extravasation with concussion.

A gentleman was at a party with some friends. He drank freely of wine, and became inebriated. His home was some distance from the place at which he was spending the evening; and his friends, seeing that he would be exposed to great risk, wished him to stop, but he could not be prevailed on. He mounted his horse; and on the way was thrown off. He was carried home; fell into a comatose state; symptoms of concussion first came on, loss of voluntary motion, at first no appearance of extravasation of blood was present; two, the following morning, apoplectic stertor came on, and at eleven he died. Case.

In this case, symptoms of concussion came on first, and those of compression afterwards. Blood was found extravasated in the brain, as might be expected. It is found, gentlemen, that the extravasated blood, producing compression of the brain, is generally situated in three different parts:— Post mortem.

First, between the dura mater and pia mater. Second, between the pia mater and brain; and, lastly, within the substance of the brain itself. In this case (Sir Astley pointing to a specimen on the table before him) there was a considerable quantity (three ounces), the largest I ever saw effused beneath the dura mater. In this also (pointing to another) there was a large quantity extravasated opposite to the anterior inferior angle of the parietal bone and meatus auditorius externus; and the dura mater itself was torn.

Second, between the pia mater and brain: this is of more common occurrence; and in this case a large portion of the brain will often be found covered over with blood, not that the quantity of blood extravasated is considerable, but a little is diffused over a large space. This portion of brain before me was taken from a man who fell, I believe, from the yard-arm of a ship, and who was carried to the other hospital (Guy's); he died four hours after his admission; and on examining, after death, the vessels going from the pia mater to the brain were completely torn through.

Third, within the substance of the brain itself; this (alluding to a specimen on the table) was taken from a person in the city, who had extravasation within the brain from an accident; after the injury he considerably recovered, though pain still continued in the head; in three months afterwards he died, and on examination there was found in the anterior lobe of the cerebrum a coagulum of blood, no portion of which had been absorbed, as the surfaces close to the brain were quite smooth.

Recapitulation.

These are the three situations in which extravasated blood is principally formed. I do not find any difference of symptoms produced by the different situations of the blood; the compression is produced by the pressure of the blood, and the quantity of blood effused will depend on the size of the vessel of the dura mater that is divided: whatever is the situation then of the blood, the symptoms of compression are the same: if there should be any blood resting on the origin of a nerve, there will be partial paralysis of the part which that nerve supplies.

Treatment.

In the treatment of these cases there is little to be done. If

extravasation of blood occurs with fracture, trephining may be of use. You should deplete freely, for the purpose of preventing inflammation: irritation is to be lessened, the bowels are to be opened, and the patient kept very quiet. If there is a bruise near the fracture, indicating the spot where the effused blood is, you may trephine, that is, before symptoms of excitement come on: when they take place, you must deplete only, and not dream of performing the operation; to do it under such circumstances would be highly absurd, and the height of madness.

ON FRACTURES OF THE SKULL.

Fractures of the skull are not of themselves dangerous, nor are they injurious to the brain; therefore these fractures do not call for any alarm, if care be taken to prevent the inflammation; the danger in these cases is to be apprehended from disturbance in some distant part, irritation of the system, or extravasation; it is not then, I repeat, from the fracture itself that the danger is to be apprehended, but from compression of the brain, extravasation of blood, or irritation in some distant part; therefore, when called to a case of fracture of the skull, you do not operate, but consider the symptoms that are present, endeavour to ascertain from what they arise, and then regulate your treatment accordingly; if the symptoms are those of concussion, the treatment must be directed to it; if those of extravasation of blood, and there is not much excitement, it will be necessary to remove a portion of bone; but if there be fracture only, without any of the symptoms above mentioned, there will be no occasion to operate.

Fractures at the base.

When a fracture occurs at the base of the skull, it is much more dangerous than at any other part, because extravasation is much more likely to take place; or if not, inflammation of the brain, from the violence of the injury received, very often supervenes. The mode in which these fractures are produced, is by falling from a great height on the summit of the head: when all the weight of the body rests on the foramen magnum, and cuneiform process of the

os occipitis, great injury is in this way done; as in very many cases a transverse fracture through the foramen magnum, cuneiform process, and part of the temporal bone is the consequence; a discharge of blood into each meatus auditorius, takes place, and where there is no other mischief, deafness often remains for life.

Case.

A curious fracture within the orbit sometimes occurs, as in the case from which this specimen (pointing to one on the table) was taken, when destruction of life was the consequence of the injury received. I will give you the history of the case:—A child was playing with a scissors, when the point of it entered the upper part of the orbit, between the ball of the eye and the superior eye-lid; the scissors was with difficulty extracted; the child's eye did not become inflamed; after the accident the child walked from Walworth to Mr. W., of Hatton Garden, who attended it; on the 10th day from the time of the mischief, symptoms of compression of the brain came on, rigors, inflammation of the brain supervened, and the child died; on examining the body after death, it was found that the scissors had penetrated through the orbitar process of the os frontis, and lacerated the dura mater; a considerable quantity of extravasated blood was found, and the anterior lobe of the cerebrum was punctured by the point of the scissors, from which it had received the injury.

Effect of a blow.

It now and then happens that a blow received upon the summit of the head will produce a circular fracture of the entire cranium, commencing at the top of the head, passing down on each side through the temporal bone, and meeting at the basis.—Mr. Chandler, late surgeon of the hospital, had a case of this description; there did not appear to be any extravasation or concussion; great irritation and violent inflammation succeeded, which destroyed the patient; and after death, it was discovered that there existed a complete circular fracture of the skull, and that the anterior portion could be freely separated from the posterior. I believe these cases always terminate fatally.

Fracture of the frontal sinus.

There is a curious fracture of the skull which occasionally takes place over the frontal sinuses. When the fracture is simple, if

the nose be blown, the air escapes through the opening in the bone, and getting into the cellular membrane under the skin, renders the forehead emphysematous. If, on the other hand, the fracture is compound, upon blowing the nose, the air rushes through the wound; so that in either case, the nature of the accident may be easily ascertained.

Fractures of the skull, if unaccompanied with concussion or compression, as readily unite as fractures of the bones in any part of the body. Here is a curious case (exhibiting a skull) where a circular, or rather oblong, piece of bone was, as you may perceive, completely separated from this part of the os parietale by the cut of a sabre; and yet, from what you here see, it is evident that it became re-united. However, I will send it round, that you may have an opportunity of examining it for yourselves. Fractures of the cranium, therefore, easily unite. Where, however, large holes are made through the skull, the apertures do not again become filled by ossific matter, but by a tendinous structure formed from the bone and dura mater. The holes made in trephining are supplied in this manner, and not by bone. Also, when in fracture of the skull, where the bones are separated to any distance, the interspace will not become filled by bony matter, but remain open as you see it, (showing a skull which had been fractured, and the broken part widely separated.) Fractures unite slowly.

Treatment of Fractures of the Skull.—When there is simple fracture unaccompanied with symptoms of injured brain, you must not trephine, neither in compound fracture; but you must, by the application of adhesive plaster, endeavour to heal the wound in the scalp as quickly as possible. Let your constitutional treatment be that of depletion, by means of blood-letting and purgatives. This plan often removes symptoms of concussion, and even extravasation, which accompany these fractures; and often a few hours will show you that the application of the trephine, which you at first might have thought indispensable, is wholly unnecessary. It is wrong, therefore, to be too much in a hurry in these accidents; for irreparable mischief might arise from your converting a fracture, Treatment.

which was simple, into one that is compound. Wait, then, gentlemen, for awhile, before you operate in such cases, for the purpose of seeing what effects may be produced by bleeding and purgatives. It not unfrequently happens in these hospitals, upon persons being brought in who have received injuries of the head, that the dresser in attendance will bleed them immediately after their admission, and at the same time send off for the surgeon; before whose arrival, however, the good effects of loss of blood are apparent, and the symptoms of concussion, and even of extravasation, have often disappeared. This shows how necessary it is that you should not be too precipitate. If you act prudently, therefore, in these accidents, you will try bleeding and purgatives before you operate; for whether you do so or not, the depletion will prove of the greatest possible advantage in preventing inflammation, from which, arises the principal danger if not kept within bounds.

The next subject to which I shall direct your attention is

FRACTURE OF THE SKULL WITH DEPRESSION.

Fractures with depression.

I will tell you what you ought to do in such cases, and then leave you to act for yourselves. In order to ascertain whether the symptoms arising from depression would come on immediately after the accident, I tried the following experiment;—A gentleman having brought me a large dog, I applied the trephine to his cranium, and took out a portion of the bone. I then, with the handle of a knife, separated the dura mater from the bone; for I found that I could make no impression on the brain until I had done so, and then pressed upon it with my finger. At first the animal did not seem to feel it; but upon pressing more deeply, it produced pain and irritation, and he endeavoured to avoid us. Upon still increasing the pressure, he became comatose, and fell. I kept him in that state for five or six minutes, when, upon removing my finger, he got up, turned round two or three times from giddiness, and walked away apparently little worse for the operation. A gentleman, who felt the animal's pulse during the continuance of the

Experiment.

experiment, stated, that it became slower as the pressure became increased. In man it is the same—slow and labouring.

Apparent depression.

After blows have been received on the head, it often happens that upon making an examination of the scalp, there appears to be depression of bone to a great extent, when, in reality, there is none. Let me put you on your guard here. A person receives a blow on the scalp: the parts immediately surrounding the spot where the blow was received will rise, from the extravasation of blood, two or three lines higher than the part itself; for there the cellular membrane, having been condensed by the injury, will likewise tend to increase the deception: thus the surrounding parts are considerably higher than the middle; and the external character of the contusion is certainly calculated to deceive those who are unacquainted with the nature of these accidents. I have several times seen these affections; but the first case which I recollect was that of a child, brought into Guy's, who had received a severe blow on the head from a brickbat, which had been thrown at it by a man. All present were prepared for the operation, fully expecting that I should apply the trephine; for they felt convinced that there was considerable depression of bone; and when I stated that I should not operate, they exclaimed, "Good God! I wonder what can be his reason." This child, after having been freely bled and purged, in two or three days quite recovered.

I have often been sent for by my dressers to these cases, and have been requested to bring my instruments with me; but upon examination have found that there was no depression of bone, and that the uneven appearance of the scalp was produced by the causes before mentioned.

It also very often happens, in fractures of the cranium, that considerable depression of bone will take place from the external table of the skull being driven into the diploe, and without producing the slightest injury to the internal table; do not, therefore, be precipitate in your diagnosis, nor hastily determine upon performing an operation, which you might afterwards have reason to repent:

these fractures, however, can only occur in those of a middle age, for in the very young and in very old age, the skull is thin and without diploe. I believe in the course of my practice that I have frequently met with this accident, and we have many preparations in the museum which clearly demonstrate their true character; but the three now before me (pointing to three skulls) are, I think, quite sufficient to satisfy your minds as to the nature of this accident; here you see the external table has been driven in, and yet no vestige of fracture in the internal; here is another specimen, with greater depression; and the third still more than either, yet the internal plate is sound. I am not acquainted with the histories of these specimens, but it is evident that the persons recovered by the re-union that has occurred between the parts which were broken.

Suppose you are called to a patient who has had a severe blow on the head, and that, on examining the skull, you find a portion of bone considerably depressed. You may still find this man capable of giving a history of the accident, and that his mind is not at all affected. On the other hand, you may be called to a person who has a fracture of the skull, with depression, and who has lost the powers of mind. In such a case, if the fracture be simple, and there is no wound in the scalp, and no symptom of injury to the brain, it would be the worst practice in the world to make an incision into the part, and perform the operation of trephining; for by making such an incision you add greatly to the danger of the patient, as you make what was before a simple, a compound fracture, and consequently greatly increase the danger of inflammation. Inflammation rarely follows fracture with depression, where the fracture is simple, but very often follows a compound fracture, which is produced by making an incision in the scalp. Never make an incision, therefore, when you can avoid it, or merely because there is fracture with depression, if there be no symptom of injury to the brain. Even if there be symptoms of injury to the brain, and the fracture be simple, do not immediately trepan.

Take away blood, and purge your patient freely, and see how far the symptoms may be the result of concussion of the brain, and not of depression. If the symptoms do not yield to depletion, then, and not till then, perform the operation of trephining.

Case.

I was called to a lady who had fallen against a projection of a wall in walking across her parlour. The os frontis was driven in, but there were no symptoms of compression of the brain. I bled her, and guarded cautiously against inflammation, but there was no necessity for elevating a portion of the bone. This lady never had any symptoms of injury to the brain, and she recovered by depletion alone.

Old practice.

The old practice used to be, the moment an injury to the brain was suspected, and the least depression of the bone appeared, to make an incision into the scalp. I have heard of a dresser in these hospitals, who, having had no accident during his week, said, "I will make a cut in the head of one of my patients with fracture, for he may perhaps have depression, and I shall in this way have something to do before my week is up." This dresser ought to have had a cut made in his own head. This was putting his patient to considerable hazard; for the simple fracture would, by the incision, be rendered a compound fracture. In simple fracture, then, when it is attended with symptoms of injury to the brain, deplete before you trephine; and when it is unattended with such symptoms, though there may be depression, deplete merely, and never divide the scalp.

If the fracture be compound, the treatment must be very different, because a compound fracture is followed very generally by inflammation of the brain, and it will be of no use to trephine, when inflammation is once formed. It might be thought that it would be time enough to perform this operation when inflammation had appeared; but this is not the case, for if inflammation comes on, the patient will die whether you trephine or not, and you will be so far from arresting its fatal progress by trephining, that the operation will add to the danger of the inflammation. When inflammation of

the dura mater and membranes of the brain has been excited by the depression of the bone, you cannot retard the progress to death by performing the operation.

These principles illustrated.

These principles may be illustrated by many cases. During the first year of my apprenticeship in these hospitals, I saw two instances: one, in a patient of Mr. Cline's, and another in a patient of Mr. Birch's. Mr. Cline's patient was a man who came from Walworth, with compound fracture, from a blow on the head. A portion of bone had been forced into the cavity of the skull. Mr. Cline advised him to submit to the operation of trephining. The man said, "You may do what you like; I am no judge, but you are, so do what you please with me." Accordingly, he walked into the operating theatre to be trephined; the portion of bone was removed; he walked back again to bed, and never had a bad symptom.

Case of fracture with compression.

A short time after, a patient under Mr. Birch, with fracture and depression, was told that he was in similar danger, and advised to undergo the same operation. He was, however, self-willed, and obstinately refused to submit to it. Eleven days after the accident, he was seized with pain in the head, and symptoms of inflammation in the brain, and when he became insensible, the operation of trephining was performed; but it did not arrest the symptoms, and he died of the inflammation. In the other hospital two boys were admitted under very similar circumstances. The os frontis had, in one case, been broken by a kick from a horse, and in the other by a fall on the forehead. In the former case the portion of bone was raised, and the boy did well; but the mother of the other boy interfered to prevent the operation of trephining; and though it was performed after symptoms of inflammation had appeared, he died. It is quite true, that it often happens that fracture, with depression, is frequently not followed by inflammation, even when the fracture is compound; but we cannot be certain of this, and if it does ensue, we cannot save the patient by trephining at a late period.

Use of the elevator.

The rule, therefore, which I always follow, is this:—When I am

called to a fracture, with depression, which is exposed to view, I generally use an elevator, and very rarely the trephine. I put this instrument under the bone, raise it up, and if it has been comminuted, remove the small portions of bone. If, however, one bone is wedged within the other, I apply the trephine for raising the depressed portion of bone. The elevation of the bone is never followed by any mischief; but if you do not raise it, and inflammation follows, it will be too late to attempt to save the life of the patient.

I shall conclude, gentlemen, by mentioning two other circumstances: but they are two circumstances to which, if there be any thing valuable in the lecture, I wish most particularly to call your attention.

Epilepsy from fracture and depression

The first is this:—it sometimes happens, in fracture of the skull, attended with depression, that a small spicular portion of bone will project into the brain, so as to produce and support epileptic symptoms. A negro, who was a patient of Mr. Birch, had fracture from a blow on the head, and a portion of bone was depressed. Shortly after he was seized with epileptic fits, which continued for many years. When he was admitted into the hospital, it was found that there was still a portion of the depressed bone remaining, and the trephine was applied to it. When the circular piece of bone was completely sawed round by the trephine, so that it could be moved from side to side, Mr. Birch found a difficulty in raising it; he put the elevator under it, but still it adhered to something within. At last he took a pair of forceps, and, by using more force, he extracted a little spur or thorn, which had proceeded from the inner side of the skull through the dura mater into the substance of the brain, and was the cause of the epileptic fits. After its removal, he had but one more fit, and completely recovered.

The other circumstance which I shall mention is one which, whether we regard it in a physiological or surgical point of view, is, perhaps, one of the most extraordinary that ever occurred; and, as connected with surgery and physiology, I am surprised it has

not made a greater impression on the public mind than it appears to have done.

Case.

A man was pressed on board one of his majesty's ships, early in the late revolutionary war. While on board this vessel, in the Mediterranean, he fell from the yard-arm, and when picked up, was found to be insensible. The vessel soon after making Gibraltar, he was deposited in an hospital in that place, where he remained for some months, still insensible; and some time after he was brought from Gibraltar on board the Dolphin frigate, to a depôt for sailors at Deptford. While he was at Deptford, the surgeon under whose care he was, was visited by Mr. Davy, who was then an apprentice at this hospital: the surgeon said to Mr. Davy, "I have a case which I think you would like to see. It is a man who has been insensible for many months; he lies on his back with very few signs of life; he breathes indeed, has a pulse, and some motion in his fingers; but in all other respects he is apparently deprived of all powers of mind, volition, or sensation." Mr. Davy went to see the case, and, on examining the patient, found that there was a slight depression on one part of the head. Being informed of the accident which had occasioned this depression, he recommended the man to be sent to St. Thomas's Hospital. He was placed under the care of Mr. Cline; and when he was first admitted into this hospital, I saw him lying on his back, breathing without any great difficulty; his pulse regular, his arms extended, and his fingers moving to and fro to the motion of his heart: so that you could count his pulse by this motion of his fingers. If he wanted food, he had the power of moving his lips and tongue; and this action of his mouth was the signal to his attendants for supplying this want.

The operation of trephining.

Mr. Cline, on examining his head, found an obvious depression; and, thirteen months and a few days after the accident, he was carried into the operating theatre, and there trephined. The depressed portion of bone was elevated from the skull. While he was lying on the table, the motion of his fingers went on during the operation, but no sooner was the portion of bone raised than it

ceased. The operation was performed at one o'clock in the afternoon; and at four o'clock, as I was walking through the wards, I went up to the man's bed-side, and was surprised to see him sitting up in his bed. He had raised himself on his pillow. I asked him if he felt any pain, and he immediately put his hand to his head. This showed that volition and sensation were returning. In four days from that time the man was able to get out of bed, and began to converse; and in a few days more he was able to tell us where he came from. He recollected the circumstance of his having been pressed, and carried down to Plymouth or Falmouth; but from that moment up to the time when the operation was performed (that is for a period of thirteen months and some days), his mind had remained in a state of perfect oblivion. He had drunk, as it were, the cup of Lethe; he had suffered a complete death, as far as regarded his mental, and almost all his bodily powers; but, by removing a small portion of the bone with the saw, he was at once restored to all the functions of his mind, and almost all the powers of his body.

It appears, therefore, that in cases of depression we should not be prevented from trephining, however distant the period may be at which the accident occurred; and the patient may, after any interval, be restored to the powers of body and mind.

LECTURE XVIII.

ON WOUNDS OF THE BRAIN.

Wounds of the brain will often happen, without producing any interruption to the operations of either body or mind. But should the wound be accompanied by either compression or concussion, then the particular symptoms which characterize those injuries will be present. If, however, the wound be a simple incision or laceration, it will often prove quite harmless. Indeed, it frequently

occurs that considerable portions of the brain are lost, and yet the mental and bodily functions continue unimpaired. Epileptic fits and hemiplegia certainly sometimes follow, as effects of such injuries; but, on the other hand, brain to a great extent has been lost without having been succeeded by disturbance of either the mental or bodily functions; numerous cases of this description are upon record; several have fallen under my own observation.

A case similar to the following likewise came under the notice of a surgeon at Brighton. A dresser of the late Mr. Chandler once came to me when I was in the other hospital, and said, "Look here, Sir," at the same time showing me a portion of brain, with a piece of the pia mater attached to it. I went to see this man, and found the representation of the dresser correct; there was a large transverse opening in the os frontis, through which a considerable quantity of brain had been lost. His mind was not at all affected; neither were the bodily powers in the least disturbed; no bad symptoms of any kind followed the injury; the wound healed most favourably, and he was soon discharged. About a year afterwards, while I was at the house of a lady in the city, whom I was attending, a man walked into the room, and said to me, "How do you do?" Not recollecting him, I looked at him with some sort of surprise, as you may suppose, when he informed me that he was the man whom I had seen about a year before in St. Thomas's Hospital, with a wound in the head, and through which he had lost some of his brain. I replied that I could readily believe him. He stated that he had been quite well ever since; he had what he called an opening where he received the wound; was not subject to fits; and to show you that his mind (notwithstanding his familiar "how do you do?") had not sustained any damage from the accident, he was, at the time I saw him, conductor of an extensive business at the house where he was then living.*

* *Case.*—While living in Bridge-street, I was sent for to the Brown Bear, public house, opposite, to see a man whom I found firmly fixed on the kitchen-grate, with several persons endeavouring to drag him from it. The efforts of these persons being ineffectual, I looked underneath, and found that he was

It occasionally happens, when a portion of the brain has been lost, that a piece of the cranium will, by being driven in, occupy its place; and if, in these cases, no symptoms of compression manifest themselves, you must not elevate the depressed bone: for were you to do so, you would, in all probability, give rise to extravasation, or increase the hazard of inflammation. The late Mr. Chandler had a patient in this hospital, who, on receiving a blow from a boat-hook upon the parietal bone, had a portion of that bone driven into the brain, and at the same time a quantity of the brain was lost: at first there was hemiplegia; this effect, however, soon disappeared. The depressed bone was permitted to remain, and the individual perfectly recovered. Such cases are not uncommon, and I could relate a number of them to you.

Danger attending injuries of the brain.

The danger attending injuries of the brain arises principally from two causes, *viz.* inflammation, and the formation of fungus. 1st, Inflammation, and, 2nd, Fungus; but I am happy to tell you, that both of these may be conquered by scientific and prompt treatment. When the brain receives a wound, you must commence your curative exertions by abstracting as large a quantity of blood from the system as the constitution of your patient will bear; not, however, to such an extent as to prevent the restorative operations of nature. Do not lower the system to such a degree as to prevent inflammation altogether, as was done by the dresser in the other hospital, whose partiality for bleeding I mentioned to you a few evenings since. Though you succeed in keeping down inflamma-

actually empaled on the projecting catch of the falling-bar; I immediately placed a hand on each side of his head, and lifted it off. After being put to bed, I found a wound extending from the coronal suture, on the right side, obliquely inwards about two inches. I removed the hair and portions of bone which had been driven in; the wound was dressed with lint dipped in cold water, and strapped over. Twenty ounces of blood were taken from the arm, and the strictest antiphlogistic remedies employed. For two days he went on favourably, but the inmates of a public-house are not always the best of nurses: I had reason to suspect that they had been giving him spirits, and in consequence I had him removed to Guy's Hospital, under Mr. Key, who completed a cure in three weeks.—L.

tion, fungi will spring up; and here (exhibiting a preparation) you have an opportunity of seeing an example of the disease to which I allude. Sometimes wounds of the brain extend even to the ventricles, and here (showing another preparation) you observe that one of the lateral ventricles was laid open.

How restored.

Now, gentlemen, some days after the brain has been wounded, the divided parts begin to unite by means of the adhesive inflammation; if this process cannot effect a cure, granulations form, which at length project through the opening in the skull, and give rise to the fungus before mentioned. Upon proper treatment the safety of your patient depends. If you do not repress the growth of the fungus, there will be violent constitutional irritation, and the life of the person in jeopardy; but, on the contrary, if you attend to the condition of the wound, and prevent the fungus from rising, there will be, comparatively speaking, but little danger.

Treatment of fungus.

Well, gentlemen, the treatment is as follows:—You are to apply to the fungus a piece of lint, moistened with liquor calcis, and over this, strapping of adhesive plaster; when you examine the part on the following day, you will find the fungus considerably diminished; you are then to use a thicker piece of lint, and the strapping as before; pursuing this plan, you at length get the fungus to the level of the scalp; but this is not sufficiently low for your purpose, therefore you must still thicken the lint until you have succeeded in getting it even with the edges of the dura mater, in which position it must be cautiously preserved; when, at last, the dura mater heals over it, and your object is accomplished. We witness many examples of such cases in these hospitals. Formerly it was the practice in the treatment of these diseases to remove the bone contiguous to the fungus: immense quantities of bone in this manner were taken away, thereby affording every facility to the growth of the fungus, and which, of course, rapidly increased, until the patient was destroyed. By such treatment as this, no person could possibly recover: the method was a most injurious and stupid one: therefore let me caution you against adopting it. The plan of treatment which I have just recommended to you is

unquestionably the best, *viz.* that of repressing the growth of the fungus until the dura mater and scalp heal over it. This will be illustrated by the following cases:—

John Dent, a boy, aged eleven years, received a severe blow from the kick of a horse, on the anterior and inferior part of the right parietal bone, by which he was stunned. The same evening he was brought into St. Thomas's Hospital, in a state of stupor, with a considerable tumour under the scalp. A longitudinal incision, to the length of two inches, was made, when immediately a portion of brain made its escape, about the size of a hazel nut; and, upon introducing the finger, a fracture was distinctly felt, yet no depression was evident; but on the further division of the scalp, in a transverse direction, and turning back the edges, a very considerable depression was distinguished; in consequence of which the trephine was applied, and one angular piece of bone removed by the metacarpal saw; also, another piece, rather more than an inch in length, which was driven into the substance of the brain, was extracted with the forceps. During the operation, small quantities of brain were continually escaping with the blood; supposed to be about ʒij or ʒiiss. Every depressed portion of bone being now sufficiently elevated, the wound was dressed superficially, and notwithstanding the great degree of stupor and insensibility he laboured under, prior to the operation, his senses returned before Mr. Chandler (who operated) quitted the theatre, and from this time he appeared perfectly tranquil. The next morning he was ordered the common aperient medicine of the house, which was occasionally repeated. The wound was not dressed until the fourth day; when, upon the removal of the dressings, there appeared a disposition to fungus, arising from the brain, which continued to increase for about a fortnight. Mr. Chandler then requested that the lint (with which it was previously dressed) should be dipped in lime-water, and the same degree of pressure made use of as before. His plan had not been persisted in for more than ten days, before every particle of fungus disappeared; but it was observed, a short time afterwards, that the edges of the wound assumed a glossy

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appearance; they were, therefore, touched over slightly, every other morning, with the sulphas cupri, which occasioned the wound to contract daily, and, by the latter end of February, it was completely cicatrized. On account of losing so large a portion of bone, the brain could be distinctly seen pulsating through the scalp. He lost no blood from the arm during the cure, nor did any bad symptoms occur.

Case. George Freeman, aged eighteen years, was admitted into St. Thomas's Hospital, July 2nd, 1811, under the care of Mr. Birch, having a fungus tumour arising from the brain. The history of the case was as follows: Seven weeks before, while he was grazing a horse near Tunbridge Wells, he fell asleep, during which time the horse (he supposes) trod upon his head; the blow rendered him senseless, and he remained in this state till he was found by some men, and conveyed home. Immediately after the accident, May the 20th, upon his being put to bed in a comatose state, he was bled largely from the arm; and in the evening, remaining in the same state, also having a great deal of swelling on the scalp, the cupping glasses were applied, of which he was sensible.

On the following morning a crucial incision was made through the whole of the swelling, from which there issued a portion of blood and brain. A large piece of the os frontis had penetrated through the dura mater, nearly an inch into the substance of the brain; which, being removed, he became perfectly sensible when spoken to, and so continued: but the fæces and urine passed away involuntarily. Every thing appeared to do well, until the fungus cerebri* made its appearance, and gave much trouble; it was repeatedly cut away, and pressure applied; which not only produced great pain in the head, but occasioned sickness and vomiting, which immediately ceased when the pressure was removed. About the 15th of June, he lost his appetite, became very sick and faint upon the least exertion; when the bark was given to him, and continued till he left the Wells.

* There were exuberant granulations from the cerebrum.

When admitted into St. Thomas's Hospital, there was a considerable loss of bone on the os frontis, over the right eye, where the pulsation of the brain was evident. A fungus swelling, in a sloughing state, occupied the middle of the wound, which was surrounded with red fleshy granulations; and when the tumour was pressed on, he complained of severe head-ache, which ceased on removing the pressure. On the day following his admission, I was desired to see him; and I immediately cut away the projecting part of the fungus, and recommended pressure to be made on the part, by means of a bandage, applying to the wound a pledget of lint, wetted with lime-water. No other treatment was found necessary; by these means the fungus was kept down, the ulcer gradually contracted, and on the 9th of August it was nearly skinned over, without one bad symptom occurring during the cure. He always complained of head-ache when the bandage was applied tight. He took no medicine while in the hospital.

Mr. Henry, jun. of Keswick, was struck on the forehead by a portion of a small brass cannon, which burst while he was firing it. He was immediately afterwards found in a senseless state, but was in a few minutes able to rise and speak. Mr. Edmondstone, surgeon, was called in to see him, and arrived ten minutes after the accident. He found a wound over the left eyebrow, which he enlarged, and then discovered a comminuted fracture of the skull; the fractured portions of bone were loose and detached; the dura mater was lacerated, so as to allow of the escape of about a teaspoonful of the substance of the brain. The loose portions of the bone were removed, and the wound dressed. Soon after the operation he was sick; and his pulse being hard, he was bled twice in the following night. On the next day, some more brain, in small quantities, was removed with the dressing. A fortnight after the accident, a fungus arose from the brain, which was treated by the pressure of lint dipped in lime-water, which considerably repressed its growth. Whilst pursuing the above plan of treatment, he one day complained of severe pain in his neck, for which he was bled freely; when, in a few hours after, the fungus suddenly Case.

decreased, and soon entirely disappeared. The wound healed in fourteen weeks, and he has since remained well.

Remarks.

I observed a circumstance in this young gentleman, after his cure, which shows the influence of mental excitement in agitating the brain, and in increasing, upon the instant, the quickness of its action.

Something passed in conversation which displeased him: and his brain, which could be distinctly seen beating through the opening in his skull, immediately quickened from eighty to one hundred and twenty in the minute. Struck with this appearance, I watched it for a few minutes, and, as his mind became calm, the pulsation gradually sunk again to about eighty. He had a great dislike to, and apprehension of, the finger being applied to the injured part; and as soon as I touched it, he receded from me, and I saw his brain beating with extraordinary velocity. These circumstances strongly impress a conviction of the influence of mental and corporeal excitement, and of the necessity which exists of guarding against the one and the other.

INFLAMMATION FOLLOWING WOUNDS OF THE BRAIN.

I shall now speak more particularly of the inflammation which follows wounds of the brain, wherein their chief danger consists; which danger is much increased, if the dura mater be the part attacked.

Symptoms of inflammation

Upon the first approach of inflammation, the person complains of a great pain in the head; very quickly falls into a comatose state; and, when roused from this condition, the pain is excessive; the scalp, round the external wound, becomes œdematous, for if you press upon it, the impression of the finger is retained; the edges of the wound have a shining glossy appearance, and from the wound itself is discharged a fluid, composed of blood and serum; sometimes the parts about the wound have a sloughy appearance; the countenance is very much flushed, and the carotid arteries beat with very great force; so much so, that if his shirt-collar be open,

you can see the pulsation of the carotids, at some distance from the bed; this circumstance, of itself, would be quite sufficient to convince you that there was a great determination of blood to the brain. The next thing which you observe is, that the patient is seized with rigors, and these follow in very quick succession; hemiplegia likewise often attends, and is generally situated on that side of the body opposite to the wound; the patient remains in a comatose state, but, when roused, will give you (until towards the very last) rational answers to such questions as may be put to him. These, then, are the ordinary symptoms of inflammation of the brain, arising from wounds of that organ.

Formation of matter.

If the inflammation should terminate in suppuration, I have already shown you in a former lecture where the matter would be situated, viz., between the dura mater and skull (this rarely happens), pia mater and tunica arachnoides, pia mater and surface of the brain, and, lastly, in the substance of the brain itself.

Pus between the skull and dura mater.

When pus is situated between the dura mater and skull, trephining for its removal would be attended with complete success; but the chances of finding it there are against you, as it is generally situated between the pia mater and surface of the brain, for which an operation would prove worse than useless. Another situation in the head where matter has been found is, in the longitudinal sinus of the dura mater. This woman (holding up a preparation), seventeen months before she died, fell down stairs, and her head came in violent contact against a chest, by which she became stunned; for some time after the fall, matter was discharged from one of her ears; this at length ceased, and, to all appearance, she was entirely well. The pain, however, again returned with evident symptoms of compression; and sixteen months after the accident she was admitted into this hospital. After some remedies had been fruitlessly tried, and she had been here for a short time, it was thought advisable to apply the trephine; the operation was unsuccessful, and four days afterwards she died. Upon examination it was found that there was a small quantity of pus embedded in the

Case.

longitudinal sinus, as you here see it (exhibiting the preparation). This is the only example of the kind which I have witnessed.

In the tunica arachnoides.

The next part in which matter is situated is between the tunica arachnoides and pia mater, or between the pia mater and brain itself. This last is of most common occurrence, and in this case the matter is diffused over the hemispheres of the brain, in the same manner as I mentioned to you the other evening, that blood is when extravasated on that organ. When the matter is between the pia mater and brain, it will be of no use to operate, as very little will be discharged, there being no communication between one part and another; for the matter is contained within distinct cells, between the vessels which come from the pia mater to the brain.

In the substance of the brain.

The next situation in which matter is found is in the substance of the brain itself. Here are specimens (pointing to some on the table), in one of which matter was lodged in the anterior lobe of the cerebrum, the other in the cerebellum; in fact, it is lodged in various parts, and the only circumstance very curious in this complaint is, that you would not suppose, from the symptoms, that matter was forming; they are those of compression rather than irritation. If the membranes of the brain be attacked with violent inflammation, symptoms of irritation will be present; but if the brain itself, they will be those of compression; and the circumstance which surprises a person who examines the brain of an individual in which matter has been formed is, that so little constitutional irritation existed during its formation: it is in inflammation of the membranes, and not of the brain itself, in which great irritation is present.

Case of a child wounded by a cock.

Here is a curious specimen (pointing to one before him), taken from a child that I had under my care, and on whom I performed the operation of trephining; I will give you the history of the case:—A young child was playing in a yard where there were some fowls, when it received a wound on the head from the beak of a cock. The mother hearing the child shriek, ran to the spot, and found that there was a small wound of the scalp, but thinking that there was

no injury to the brain, she bound it up: in a week afterwards pain in the head came on, together with great constitutional irritation, and the child was brought to me. On examining the head, I found that a circular incision had been made in the bone, and that matter issued through the opening. I said to the mother, if the child is not better by to-morrow, bring it to me again, and I will allow a more free opening for the matter to discharge itself. The next day the child was brought to my house, and I performed the operation of trephining, when I found there was an opening in the dura mater and pia mater, corresponding to that of the bone; the symptoms of irritation were relieved by the operation, those of compression however came on, and in three days from the time in which it was performed, the child died. On examining the part after death, I found that there was a circular incision in the dura mater, the edges of which were hardened and thickened, as you see here (pointing to the very part), a similar state of the pia mater and brain, in size corresponding to the external opening, and an abscess between the pia mater and brain. At that time I had no idea that a wound of the description I have just mentioned could be produced by a bird of this size; but since that period, I have seen an instance of a similar kind: a pheasant, not an English, but an Indian one, made a dart towards the eye of a person, and, instead of striking it, wounded the os malæ; the bird, by means of its beak, struck a hole into the superior maxillary bone, just below the zygomatic arch.

Time at which inflammation occurs.

The time at which inflammation of the brain supervenes after the injury received, is generally about a week: rarely under that time; and this it was that led me to say, on another occasion, that inflammation of the brain was more slow in its occurrence than that of any other organ, in order to put you on your guard. It often happens that inflammation of the brain does not come on till a fortnight, or even three weeks, after the injury: therefore every surgeon who has written on the subject puts you on your guard as to the distance of time this complaint comes on after the accident: he tells you that the patient is not safe till two or three weeks

afterwards. If you read the works of Mr. Pott on the injuries of the head, you will find the circumstance mentioned; and in the work of Mr. Dease, of Dublin, (who has published an excellent treatise on the subject) it is distinctly stated, that inflammation of the brain is occasionally postponed to three or four weeks after the accident occurs, and even then, the patient is not always safe.

Case. I will give you a case relating to this subject:—Dr. Babington and myself were sent for to see a person, a clerk to the firm of Whitbread and Co., who, whilst riding on horseback, and being a short-sighted man, and riding fast, struck himself violently against the bough of a tree which was overhanging the road, and was brought to the ground by the force of the blow. He was taken to Croydon, where Dr. Babington and myself visited him. We found that he had been struck on the os frontis, just above the frontal sinuses, where there was a depression; and this was the first case in which I witnessed emphysema of the forehead produced by blowing the nose. We took all possible care of the case, bled him, regulated his diet, &c., till the inflammation had subsided. He came to town three weeks after the accident, when he asked whether he might go to Rochester, to spend a little time with some friends, who were anxious for him to come. We told him that he might, if he would pay attention to himself, keep his bowels open, and regulate his diet. After the lapse of a week he became extremely ill, inflammation of the brain came on, and he died. On inquiry, we found that he had neglected the directions given him, and allowed his bowels to get costive.

Remarks. It is always a very serious case when there is a depression on the forehead after an accident, and I will mention to you an instance of this kind, which will show you the necessity of enjoining on a patient with this injury strict attention to his mode of living.

Case. A man who had received a wound in the forehead from a pistol-shot came to this hospital: the wound healed kindly, but the depression remained. Whenever this man indulged in the use of

spirituous liquors, he used to come back with violent pain in the head, which was always relieved by blood-letting.

Treatment after inflammation.

As to the treatment of inflammation of the brain, it is the same as for inflammation generally, with this exception only, that blood should be drawn from the temporal artery in adults, and the jugular vein in children. Whenever inflammation of the brain attacks a grown person, take blood from the temporal artery; and when young individuals, from the jugular vein; by these means you abstract blood more readily from the part. Even in adults you may, after opening the temporal artery, if the symptoms be not relieved, bleed from the jugular vein. In addition to this treatment, you purge, produce perspiration, and apply blisters to the head. I have seen poultices, containing some stimulating application, of considerable use. It will now and then happen that trephining will be required; and I will tell you the cases in which it will.

THE OPERATION OF TREPHINING.

Circumstances necessary for the operation.

First. Where there is extravasation of blood between the dura mater and skull.

Secondly. In fractures of the skull with symptoms of compression continuing after depletion.

Thirdly. In simple fractures, with depression, accompanied with symptoms of compression.

Now it generally happens in these last cases, where there is matter between the dura mater and skull, that there is fracture, and this is an indication of the seat of the injury which has been done to the brain; it is also followed by rigors and other symptoms; still it will be right in some cases, where there is no fracture, and the other symptoms, rigors, &c., are present, to penetrate the bone, to see whether matter is lodged between it and the dura mater. When an abscess has formed beneath the dura mater, I have never seen a case recover trephining for it, although that membrane has been opened for its discharge.

Description of the operation.

The operation of trephining used to be one of the most complicated kind, requiring several instruments, the learning of which was in itself quite a study; it is now quite simple, and few instruments only are wanted, which can very easily be put into a small case. Let us go over the instruments formerly used in this operation; but really, gentlemen, they were so numerous, I don't know whether I can count them. They used then a scalpel, rougee, pin, perforator, crown, brush, elevator, lenticular, and a pair of forceps; now you may see (holding a case in his hand) these three instruments will be quite sufficient, a knife, with a double edge, in order to scrape off the pericranium, an elevator, and a trephine having a crown, and a pin which will allow of being easily moved.

Parts on which the trephine must not be applied.

Now, gentlemen, I will tell you in what parts the trephine should not be applied. First, you should never trephine in the line that extends from just above the nose along the top of the head to the tuberosity of the occiput; over the frontal sinuses it is obviously improper; and at the summit of the head you will meet the sagittal suture, where the dura mater adheres with extraordinary firmness, and the longitudinal sinus might also be wounded; and at the posterior part you have the superior portion of the perpendicular spine of the os occipitis; therefore, in this line you ought not to trephine. I should mention this particularly to young persons, who very often disregard this rule, thinking they know much better than those who have preceded them; if, however, they trephine in this part, the more fools they, and I will tell you why: they are running, in operating in this part, an unnecessary risk, by cutting on a long hole covered over by a smooth membrane, when they might do it as well on either side. It would be the folly of presumption to trephine on this line. There are two other parts in which the operation of trephining should not be performed; first, over the anterior inferior angle of the parietal bone, just above the zygoma; secondly, behind the ears, on the posterior inferior angle of the same bone; and why, no doubt, most of you by this time

know; opposite to the anterior inferior angle of the parietal bone is the great artery of the dura mater, and opposite to the posterior inferior angle is the great lateral sinus.

Fractured portions of these bones may be raised by the elevator: and I may observe here, that this is the instrument chiefly used in cases where the fractures are running in the direction of these parts. Elevator to be used.

Mr. Hey's saw is a very useful invention. It is gratifying to state that we are seldom now called to perform this operation. Suppose, however, you were called to a case requiring it, where there was a wound, together with depression of the parietal bone, you would put your finger into the wound, and if the portion of bone depressed were small, you would make a simple incision, and turn the integuments aside, so as to reach the bone. If, by this incision, you found depression with fracture, you enlarge it in the course of the fracture: if the depression were large, you would make a crucial incision, and turn aside the portion of integument, so as to open a space for the application of the trephine: then, with the back edge of the knife (which should be made a little stronger than usual,) you cut through the pericranium, and scrape it off. For this purpose the rougee was formerly employed. [There was a subject on the table, on which Sir Astley performed the operation as he went on describing it.] Now I put the pin on the skull, and the crown being adjusted, I fix it, and begin the circle. Well, gentlemen, having made a circle, I remove the pin: in young persons it will be necessary to do this soon, because the bone is readily sawn through. I never myself saw a case in which the pin entered the brain; but my nephew was present when the operation of trephining was performed, and the *pin was forgotten*, so that it entered the brain, and inflammation of the dura mater came on. I can conceive that a man, in his first operation, anxious how he shall succeed, might forget it. When using the saw, let your bearing on it be as even as possible, else you will be through one part of the skull before another. There is but one danger in performing the operation of trephining, and that is,

Hey's saw.

Mode of performing the operation.

wounding the dura mater. When trephining on living subjects, you are informed of the progress you are making by blood issuing from the wound when you reach the diploe: and when you see the blood, you will know. that you are half through; but, recollect, in very young or old persons there is no diploe; therefore, very few turns of the saw will do. As you proceed with the sawing, you must introduce your probe, to see how nearly you are through; you sound as you go on. When I find that I have sawn through in one part, I introduce the elevator, and lift the portion of bone, the parts not cut through being easily broken. I find by my probe that in the part near the sagittal suture I have sawn through; I introduce the elevator, feel the bone move, and know that a very few turns will do, taking care not to lean on the side through which I have already sawn. The bone can be raised and loosened; I am quite certain that the dura mater is not injured, and by introducing the elevator, the bone may be removed from its place.

Danger of the operation.

Some people say that this is a trifling operation, not difficult to perform, nor dangerous: but they deceive you: it is one of the most dangerous operations in surgery; whilst performing it there is but a single step, a small net-work between your patient and eternity; saw through this, and destruction of life will generally be the consequence. Mr. Hunter made an assertion, that when the dura mater was wounded, the person never recovered; which, though not exactly borne out by the cases which have occurred since, shows the impression made on the mind of a man who was such an observer of nature. Before his death, Mr. Hunter saw a case of a wound of the dura mater recover. It is certain that there is less danger when the dura mater and pia mater are both injured: the danger is more when the dura mater is injured without the pia mater. I will give you the reason: in the former case, where both the dura mater and pia mater are wounded, a fungus immediately projects, and fills up the cavity. If, however, there is only a small opening in the dura mater, and I were to put some quicksilver into it, where would it go?—into the lower part of the spine between the tunica arachnoides and dura matral covering; inflammation of

the dura mater would spread over the whole cavity of the canal, as erysipelas does over the surface of the body; whereas, in the first kind of injury, fungus will project through the opening, which would easily close by the process of adhesion that would take place. I have seen many instances where the dura mater and pia mater have been wounded, but few where the dura mater only has been.

After trephining, the elevator should be introduced to raise the depressed bone, and in this way return it to its natural situation. You see that there is no necessity to operate where there is any additional risk, because an operation in a part where there is no risk can be as well performed, the object being only to raise the bone. The scalp is to be returned over the opening, and a poultice should be applied, which, I believe, is the application most congenial with the feelings, and most conducive to the safety of the patient.

If there be a necessity for taking away more than one portion of bone, the same plan is to be pursued in each operation.

LECTURE XIX.

ON WOUNDS OF THE SCALP.

Their danger.

On this subject I have but few observations to make. Wounds of the scalp are not devoid of danger, and I have known several instances in which apparently slight wounds of that part have destroyed life. They are more especially dangerous if accompanied with contusion. If a person receives a blow from an instrument capable of lacerating the part, and considerable inflammation follows, the wound will sometimes destroy life. There are two ways in which wounds on the scalp occasionally prove destructive of life: first, by producing erysipelas; and, secondly, by producing inflammation of the tendon of the occipito-frontalis: thirdly, by a simple compound fracture, they produce a more extended inflammation of the dura mater.

Mode in which they destroy life.

A man came to the other hospital, a short time ago, with a wound of the head, from a blow which a companion had given him. The dresser thought it too slight a case for admission into the hospital; but a few days after the man returned with violent pain in the head, a considerable swelling of the scalp, and erysipelatous inflammation extending over the whole face and neck. He was admitted into the hospital for the erysipelatous inflammation, of which he afterwards died. Upon examining the body, there was found an effusion on the membranes of the brain between the tunica arachnoides and the pia mater. The other way in which wounds of the scalp destroy life is, by producing inflammation of the tendon occipito-frontalis, which extends over the whole surface of the head. This inflammation covers the scalp and face, and assumes an erysipelatous character, but it is not true erysipelas. It has not the vesicles of blisters filled with serum, which commonly attend erysipelas, but it has a tendency rather to suppuration; and if the constitution has strength to produce this suppuration, it takes place between the tendon and the pericranium. In this way a very extensive abscess is often formed, into which we are obliged to make an incision, in order to discharge the matter, which cannot make its way through the tendon. Extensive disease is thus produced, and the inflammation attending it sometimes destroys life. I have already alluded to a case that occurred recently, in which a person died of erysipelas, which followed the removal of an encysted tumour. The tumour had been removed twice before, and, to prevent its recurrence, an incision was made so deep as to lay bare the pericranium, and in this operation the tendon had been cut through. There is a great deal of danger in inflammation arising from this cause, and it is on that account that I was anxious to point out to you, in a former lecture, the impropriety of making incisions in the scalp merely for the sake of exploring the nature of the injury. Third mode in which wounds of the scalp prove destructive, is by incisions being made to trace fractures of the skull, producing in this way great aggravation of the inflammation, and extending its influence to the membranes of

the brain. An incision in the scalp should, therefore, be never made, but in cases of imperious necessity.

ON INJURIES OF THE SPINE.

Injuries of the spine produce effects similar to those arising from injuries of the head; the spine being liable to concussion, extravasation, fracture with depression, suppuration, and ulceration.

Effects of.

Cases of concussion of the spine are not very unfrequent. They occur more commonly in the lumbar region than in other parts of the spinal column. A violent blow on the loins produces paralysis of the lower extremities. The paralysis, however, is not complete; the person is unable to support his body, but generally some power of moving his limbs remains. This paralytic state, arising from a blow on the loins, is in general easily removed in the following manner:—

Treatment.

You apply cupping-glasses to the part, and take away blood from it several times with the scarificator. If, at the end of a week or ten days, the paralytic state still continues, you must apply a blister to the loins, and keep it dressed with equal parts of the unguentum lyttæ, and unguentum sabinæ. The lyttæ being in this way absorbed into the constitution, diminishes the disposition to paralysis, while the counter-irritation also produces good effects. Such is the plan of treatment to be pursued in cases of concussion of the spine.

Extravasation.

With respect to extravasation on the spine, the examples are but few in which this has occurred. The cases which are more particularly impressed upon my mind are, first, one which was examined in this hospital by Mr. Henry Cline. A person received a severe blow near the cauda equina, by the last dorsal vertebra. He had paralysis of the lower extremities, and shortly after died.

Case.

Case.

The second case was one under Mr. Heaviside, in which I and Dr. Baillie were also consulted. A young gentleman was swinging with a party of boys, when one of his companions pushed him, that he might rise as high as possible, while two others ran in the opposite direction, and caught him in the neck with a rope, as he

descended. He was thrown out of the swing, and when he was taken up, was found to be paralytic in the lower extremities. He soon became paralytic in his upper extremities also, and a few weeks afterwards he was brought to town in this state. It was suspected that there was some disease of the spine, produced by the injury the neck received, when the rope suddenly caught it, but no deformity could be discovered. An issue in the neck was advised, with a view of producing counter-irritation; but before this plan could be carried into effect, the boy died. On examining the body, it was found that one of the vertebral arteries had burst, and that extensive extravasation had taken place from the foramen magnum to the sixth cervical vertebra. The whole sheath of the spinal marrow was covered with blood. Mr. Heaviside has a beautiful preparation made from this subject.

Treatment.

These cases, probably, admit of no remedy where the extravasation is considerable. I do not know what can be done, except to bleed in the first instance, in order to prevent further extravasation; and afterwards to promote absorption, and excite counter-irritation by the application of blisters. I mention these cases to you as worth knowing, that you may make your own observations on them when they occur, rather than as cases about the treatment of which much is understood in the present state of our knowledge. They are of too rare occurrence to enable us to lay down any positive principles as to the mode in which they are to be treated.

ON FRACTURES OF THE VERTEBRÆ.

Fractures, with displacement of the spine, are by no means unfrequent; they have been improperly called dislocations; but dislocations of the spine are extremely rare, and only occur in the cervical vertebræ. What are called dislocations are, in fact, fractures with displacement. It is not that one vertebra is separated from another, for this very rarely happens, and only in the cervical; but that vertebra is broken through. When fracture, with displacement of the spine occurs, paralysis takes place in the

parts of the body situated below the injury. If it occur in the loins, paralysis of the lower extremities follows; the power of retaining the fæces, and of expelling the urine, is lost. When the injury occurs in the dorsal vertebræ, there is paralysis of the lower extremities; the same loss of power in retaining the fæces, and expelling the urine, with this addition, that it is accompanied with considerable inflation of the abdomen. This inflation might lead the surgeon at first to suppose that there was some rupture of the intestines; but after a few hours, when the patient has had free evacuations, this inflated state of the intestines disappears. The inflation is produced by the great secretion of air into the intestines, in consequence of the diminished powers of the part. Symptoms.

When the injury occurs below the fourth cervical vertebræ, paralysis takes place in the upper as well as the lower extremities, though not in the same degree. There is a numbness of the upper extremities, but seldom such a degree of paralysis as to deprive the patient of all power, when the injury occurs below the fourth cervical. The time in which the person dies from these injuries varies according to the seat of the accidents. If it occur in the loins, the patient will generally die in from five to six weeks; if the displacement be very considerable, he may die in three weeks: on the other hand, when the displacement is slight, the patient may live many weeks, and even months. I have known a person live two years after an injury which was supposed to be a case of fracture, with displacement of the lumbar vertebræ. As there was no examination of the body, after death, in the case to which I allude, some doubt must necessarily exist as to the exact nature of the injury; for morbid anatomy can alone teach you the real nature of disease. When fracture with displacement occurs in the dorsal vertebræ, the patient generally lives a much shorter time; though even in this case I have known a person live nine months. A person of the city, named W., riding on Epsom Downs, at full speed, came to a road which led to a chalk or gravel-pit, and finding that he could not stop his horse, he put spurs to him to endeavour to clear the pit. He succeeded in doing this, but the Of the lower cervical. Case.

horse, in consequence of the effort, fell on the opposite side, rolled over him, and broke his dorsal vertebræ. Paralysis of the lower extremities followed, but this gentleman lived four or five months after the injury. When fracture with displacement occurs between the fourth and seventh cervical vertebræ, the patient generally lives four or five days. I have known a person die as early as forty-eight hours after the injury. If the injury occur between the second and third, or between the third and fourth cervical vertebræ, the person dies on the instant.

Of the upper cervical.

Cause of death.

Those who have attended in the dissecting room can readily explain how this happens, and would, perhaps, feel themselves insulted if I were to explain it to them. Those who have dissected less, will excuse me for saying that instant death ensues in this case, because the injury occurs above the origin of the phrenic nerve, which is the only agent in supporting respiration after pressure on the spinal marrow has occurred. The function of respiration, after pressure on the spinal marrow, is supported by the diaphragm only, and when the fracture with displacement occurs above the origin of the phrenic nerve, the diaphragm loses its power, and instant dissolution is the result.*

Fracture without displacement.

Case.

But it sometimes happens that the cervical vertebræ are broken without displacement. When this occurs, some curious circumstances take place. At the time I lived with Mr. Cline, the following case occurred:—A girl received a severe blow on the neck, after which it was found, that whenever she attempted to look at any thing above her head, she was under the necessity of putting her hands behind it, and gradually elevating it to the object. When she wanted to look at any thing beneath her head, she put her hands under her chin, and lowered her head to the object. If any other child in play ran against her and shook her body, the concussion produced uneasy sensations, and she would run to a

* A luxation of this kind can only take place, either forward or backward, consequently, if instant means were employed to restore the parts to their natural situation, the pressure on the phrenic nerve would be removed, and respiration restored.—L.

table, or any place on which she could rest her head, and support it with her hands under her chin until the agitation produced by the shock had subsided. The child lived twelve months after the accident. On examining the body after death, Mr. Cline found the atlas broken through; there was a transverse fracture of the atlas, but no displacement. When she endeavoured to raise her head, the dentiform process quitted its natural situation, and carried back a portion of the atlas; when her head inclined forward, pressure was produced upon the spinal marrow, as it was likewise when the body was agitated. This is a curious instance of fracture occurring in the cervical vertebræ without displacement. With respect to the treatment of fracture, with displacement of the spine, nothing has hitherto been effectually done in surgery.

Mr. Cline's operation.

Mr. Henry Cline was the first person who attempted to give relief in this accident. Being an excellent anatomist, and a most able surgeon, he saw no reason why cases of this kind should not be treated as cases of fracture with depression of the skull. Accordingly he cut down upon the arch of the spinal marrow, where the compression was greatest, and, with a small trephine of his own invention, he sawed through the arch of the spinous process, and took off the pressure on the spinal marrow, by raising the depressed portion of the arch. It is well known, that in cases of fracture where the displacement has been slight, union of the bone has been produced. There would be no difficulty in producing this union, supposing the pressure on the spinal marrow to be removed. There is a preparation in Mr. Brookes's collection, from a case of fracture with depression, where the person lived long enough for the fracture to be united; and in the College of Surgeons there is a preparation presented by Mr. Harold, of Cheshunt, from a case where union of the bone took place after fracture with displacement. There is no danger, therefore, as to the restoration of the arch of the bone, if the pressure on the spinal marrow could be removed; and it was with this view that Mr. Cline sawed through the arch. It is right, however, to mention, that in many of these cases the spinal marrow is itself torn through. In some cases of fracture with displacement,

it is completely torn; in others partially; and in some not at all. In cases where it has not been torn, there would be hope from such an operation; and it is in these cases that the operation has been performed. Mr. Tyrrell has performed the operation since Mr. Cline, but both cases have terminated unfavourably. Whether future experiments may be attended with better success it is impossible to say. The proposal was laudable; the operation was easily performed; and as to the result, if the spinal marrow were not torn, there seems no reason why a person should not recover after such an operation. We are obliged, however, to speak doubtingly on this subject, since the first experiments have been unsuccessful. If you could save one life in ten, ay, one in a hundred, by such an operation, it is your duty to attempt it, notwithstanding any objections which some foolish persons may have urged against it. Suppose any one now present were in this state himself; suppose him put to bed with a paralysis of his lower extremities, and fully acquainted with the inevitable result if nothing were done; would he not be glad to have any attempt made to save him? Would it not be foolish and unmanly to say, he would rather die than have such an attempt made? The operation is not severe; it cannot add to his danger; and as to the pain, no man would regard it. In the two cases in which the attempt was made, the operation did not shorten life; on the contrary, there is reason to believe that it prolonged it. You will be justified, therefore, in making the attempt. Though I may not live long enough to see the operation frequently performed, I have no doubt that it will be occasionally performed with success. There is no reason why it should not; and he who says that it ought not to be attempted is a blockhead.

ON SUPPURATION AND ULCERATION OF THE SPINAL MARROW.

The only case in which I have had an opportunity of ascertaining this disease by dissection, was the following:

Case. A gentleman who resided eight miles from London, had, by a fall,

received a severe blow on his spine, which did not, however, produce any immediate ill effect. Some time after, having been much exposed to changes of weather, he was suddenly seized with pain in his back, which was followed by paralysis, retention of urine, and involuntary discharge of fæces. I was requested to see him on account of the retention of urine, and attended him for a length of time, for the purpose of using the catheter. For several weeks his symptoms remained unchanged, excepting the appearance of a troublesome sore on the nates. Towards the close of his existence, he complained of much uneasiness and distension at the upper part of his abdomen. His appetite failed, he rejected his food, and he had a great deal of fever, with quick pulse, and profuse perspiration. He gradually sunk.

Upon opening the spinal sheath, a milky fluid was found within it, just above the cauda equina; and higher up, about three inches, the spinal marrow was ulcerated to a considerable extent, and in that softened state which the brain assumes when putrefaction has taken place. All the other parts of the body were healthy, except the bladder, which was considerably inflamed. Dissection.

In a case like this, it will be necessary to employ cupping, or leeches, to prevent inflammation: subsequently, counter irritants, such as blisters, tartar emetic; issues, or setons, may also, in some cases, prove beneficial. Treatment.

I shall now proceed to describe to you

ANEURISM.

Aneurism is a pulsating tumour containing blood, and communicating with the interior of an artery. There is one exception to this definition, namely, where aneurism, as it sometimes happens, takes place in the heart. Definition.

Aneurisms are situated either externally or internally; that is, they are either so situated on the limbs as that access may be had to them, and the nature of the disease clearly ascertained; or they are so placed in cavities of the body, such as the abdomen, chest, External or internal.

and cranium, as to render the nature of the disease very often extremely doubtful.

Three stages of external aneurism.

With respect to external aneurism, the symptoms may be divided into three stages. When you have an opportunity of seeing aneurism in its early stage, you will find a small tumour pulsating very strongly—much more strongly than in subsequent stages; for it may be taken as a general rule, that the force of the pulsation is in the inverse proportion of the size of the aneurism. When an aneurism is first formed, it contains only fluid blood; and if you apply your finger to the artery between the aneurism and the heart, you will readily empty the aneurismal bag by the pressure. In this state there is scarcely any pain, and no other alteration in the limb than some irregularity of circulation, producing spasm in the muscles; and when the patient is going to rest, cramps in the legs, and sudden twitchings, which prevent him from sleeping.

Second stage.

The next state in which we find aneurism is, when the blood is beginning to coagulate in the interior of the sac, the coats of which are very considerably thickened. At this time, if you press on the artery, you may empty the sac in part; you will see the swelling re-produced when you take off the pressure. You cannot completely empty the bag by pressure, for a considerable degree of swelling will still remain. There is some degree of pain in the limb below in this stage of the disease, in consequence of the size of the swelling, and the pressure on the surrounding parts. The aneurism becomes a solid swelling, instead of a mere bag containing fluid blood, and the circulation is retarded by the pressure on the surrounding parts.

Third stage.

In the next stage the aneurism has acquired considerable magnitude, and the pulsation is in a great degree lost. Pulsation may be observed in some one part opposite to the opening from the artery, but it is seldom perceived over the whole swelling. A small portion of the blood still continues in a fluid state, but the greater part of it is filled with coagulum. In this state, if the aneurism be behind a joint, the motion of that joint becomes impeded. Popliteal

aneurism is one of very common occurrence; there is an enlargement behind the knee, just at the bend of the joint, with a pulsation; the foot and leg of that side are swollen; the swelling gradually increases, and the aneurism becomes of a dark colour; inflammation of the cuticle covering the sac ensues, vesication of the cutis, to the size of half-a-crown, takes place, and the skin in this part is quite insensible.

Mode in which life is destroyed.

In a few days an eschar is formed, the bag opens; bleedings, one after another, take place, and the destruction of life is the consequence. What you read in books respecting the mode in which death is produced in these complaints is, that the sac bursts, and the patient is destroyed by the sudden gush of blood; but I tell you, gentlemen, it is no such thing; it is not from the sudden bursting of the aneurismal bag that the person dies, but by repeated bleedings from the part. At first the bleeding is small, but as the eschar increases, and the separation of the parts takes place, it becomes more; the wound is produced by means of the sloughing process, like a slough in any other part, and an opening is formed which leads into the aneurismal bag. At the commencement the wound is small, and blood issues from the part; lint is applied to the wound, and the hemorrhage is stopped; but as the eschar proceeds, and the size of the wound increases, the hemorrhage returns; and thus, by repeated hemorrhage, destruction of life is produced, and not by any sudden discharge of blood from the sac; it is not in aneurism of the extremities only that death thus takes place, but in aneurisms that occur internally; in the chest, for instance, the same circumstances happen as I have just mentioned.

Not always fatal.

Aneurisms, if not operated on, are not always destructive of life. I have, however, known the bursting of an external aneurism cause immediate death. A man had an aneurism in the groin, which burst on his making an attempt to throw off his bed-clothes, and to raise himself in bed—he died in a few moments. I have seen gangrene of the foot and leg, as far as the knee, from aneurism, take place, without destroying life. I saw a case where the foot and lower part of the leg became gangrenous in a man labouring under popliteal aneurism; they sloughed off; amputation was

performed just above the ankle, and the patient recovered. Destruction of life then takes place in aneurism from repeated hemorrhage and gangrene. Gangrene of a small part of the limb in aneurism may occur, and still be remedied by means of surgical aid.

Aneurism of the heart.

The history of *internal* aneurism is different from that of the external. I will describe it to you in a few words, though the subject is by far too ample to be properly treated of at present. I mentioned to you just now, in the definition that I gave you of aneurism, that there was an exception to it, and that was the heart itself, when the subject of aneurism. Here is an aneurism (pointing to one on the table) of the heart; this and two others are all that I have ever seen; for what are often called aneurisms of the heart are not really so; they are a simple dilatation of the ventricles. An aneurism of the heart consists of a bag formed out of the parietes of that organ, and in this bag an opening is formed, as in the aneurisms which take place in arteries. In this specimen there is a bag formed of the parietes of the left ventricle, considerably larger than an orange, together with an opening which communicates with it.

Case.

The other instances which I have seen of aneurism of the heart are the following: A soldier of the guards had committed some offence, for which he was severely flogged; being a determined fellow, he resolved not to cry, and whilst he was receiving the punishment he held his breath; a short time after this he was seized with violent pain in the chest; Mr. Palmer, surgeon to the guards, was sent for, and he found him dying, as he thought, of ascites and œdema of the lower extremities. He soon died, and on examination it was found that there was an aneurism of the left ventricle, which had burst, as the pericardium was very much distended with blood.

Case.

Mr. P. of Chichester, surgeon to the militia, was sent for, to see a man who had symptoms of a diseased heart, and intermitting pulsation; he had also ascites and œdema of the lower extremities. This man died, and there was found an aneurism of the left auricle. A curious circumstance in this case was, that the blood had

insinuated itself into the coats of the left auricle; the aneurism was of the size of a walnut; its coats had given way, and nature, as it were, thus unloaded herself. These three cases of aneurism of the heart are the only ones that I have seen.

ANEURISM OF THE ASCENDING AORTA.

Aneurism of the ascending aorta, just at its commencement, where it is covered by the pericardium, is not of uncommon occurrence. Here are two examples of aneurism in that situation (pointing to the specimens on the table) of the size of a walnut; they had burst into the pericardium, which, on examination, was found filled with blood. I will give you a singular case, in order to put you on your guard, as you must expect to meet with thorns as well as flowers in the profession. A man was brought to the other hospital labouring under popliteal aneurism; I told him he must submit to an operation. In order to have the principal artery of the thigh secured, he sat down on the table, and was placed in the usual position; before I had quite reached the sartorius muscle, I saw him stretch himself on his back, and perceived urine coming from the penis. I immediately said, This is more than the expression of pain and the apprehension of danger. He got up, made a gasp; I took out a lancet, opened a vein, but no blood came. I then tried to obtain some from the jugular, but in vain; in three minutes he was quite dead. I said, gentlemen, as you have seen the death, you shall see the examination. He was conveyed to the dead-house; and the next day I opened the chest, and found the pericardium distended with blood, containing from a pint to a quart; and at the beginning of the aorta, just above the valves, there was an aneurism of the size of a walnut, which had burst. It is well that, in this case, the ligature was not applied, or the principal vessel divided, else the surgeon would probably have had the credit of killing the patient. Case.

I mention this case to put you on your guard, that you should never operate for aneurism till you have ascertained whether there be one situated in any other part; for it frequently happens, that Admonition.

aneurisms attack several parts at the same time. This I know, that a man came into this (St. Thomas's) hospital, with popliteal aneurism: and the operation was about to be performed, when, on account of a pain in the abdomen, it was postponed. Before the next operating day he had died suddenly, and, on examination, an aneurism was found between the two emulgent arteries. Well, then, before you operate for aneurism, see whether there be pain and pulsation in any other part.

LECTURE XX.

ANEURISM OF THE ARCH OF THE AORTA.

Absorption produced.

When an aneurism takes place between the heart and curvature of the aorta, you find, after a time, from the pressure of the aneurismal bag, the cartilages of the ribs become absorbed, as in the specimen before me (pointing to one on the table), where the cartilages of three of the ribs, and a portion of the sternum, have been absorbed; when the aneurism presses on the lungs, dyspnœa comes on, together with cough, and the complaint is obscure, but at last the fulness on the right side, and the pulsation to be felt by the pressure of the hand on the intercostal spaces, will enable you to distinguish this disease; then the ribs become absorbed, the aneurism presses against the pectoral muscle, absorption reaches the skin, and the sac bursts by the inflammation of the skin, the destruction of the life of the part, and the separation of the eschar.

Case.

I will mention to you a case, which shows how life may be prolonged sometimes by the formation of an artificial sac: a female in the other hospital had an aneurism of the ascending aorta; the skin had become inflamed, the eschar was separating, and a small quantity of blood was discharged; a clot of blood plugged up the orifice of the opening; pieces of lint were applied, over which was put some adhesive plaster, and lastly a bandage. She lived twenty-seven days afterwards; the opening of the wound,

however, gradually increased, and she died in consequence of inflammation of the interior of the aneurismal bag and aorta.

When, therefore, you are called to a person with an aneurism in this part, and when hemorrhage has come on, you can protract life by coating the wound with lint, and endeavouring to form an artificial sac; and by this means you give your patient two or three days, or weeks, to live, allowing him that time for making any preparation he may wish. These cases are, however, quite hopeless, and I have never known one spontaneously cured. Art may prolong life.

ANEURISMS OF THE ARCH BURSTING INTO THE TRACHEA.

These aneurisms are very frequent, and are to be seen just above the sternum. You will find that termination of existence takes place in different modes in these aneurisms. In the specimen before me (exhibiting one on the table), death was produced by the bursting of the artery into the trachea; it was given me by Mr. Davis, and was taken from a man, the subject of aneurism of long existence; rising from his bed one day, the artery must have burst into the air tube, cough came on with a sudden gush of blood, and he died, partly from suffocation, and partly from loss of blood. An aneurism of this kind often causes, by its pressure, dyspnœa and suffocation; it also often presses behind on the œsophagus, instead of in front on the sternum; it will be seen in the back, through the ribs, by the edge of the scapula, between its base and the spine.

Now, gentlemen, I will tell you one or two practical points here, to put you on your guard, and induce you to take great care in these cases. Mr. Dyson, of the city, called on me one day, and said that he had a patient with aneurism of the neck, which he thought was an aneurism of the carotid, and that he should like me to see it. I immediately went with him, and on examining, midway between the clavicle and lower jaw there appeared to be a collection of fluid proceeding to behind the sternum. I told Mr. Dyson, that I was very doubtful of its being an aneurism of the carotid. Some time after this, Mr. Dyson sent for me to go with Practical cases

him to examine the body of this person; we found a small pouch, just behind the sternum, proceeding from the curvature of the aorta. It was of very great importance that a ligature had not been applied: the sac would have been cut through, and destruction of life taken place.

Simulates carotid aneurism.

The late Mr. Burns, of Glasgow, who was an excellent anatomist, and who published a capital work on the surgery of the head and neck, wrote to me to say that he had a case of aneurism above the clavicle, and entertained some thoughts of tying the subclavian artery for it, and asked me some questions relative to it, to which I returned an answer, and said to him, take care, do not deceive yourself, for what often appear to be aneurisms of the subclavian artery, are really aneurisms of the aorta. The operation was not performed. (It is mentioned in Mr. Burns' work.) The patient afterwards died, and on examination it was found that it was an aneurism of the aorta; therefore I mention this to put you on your guard, for after what you have lately seen at Guy's Hospital, don't think the operation an easy one, and that it would add greatly to your credit to perform it. You might very easily mistake aneurism of the aorta for aneurism of the carotid or subclavian arteries.

ANEURISM OF THE ANTERIA INNOMINATA.

These cases in general do not allow of an operation being performed; there is no room for the ligature. Dr. Mott, of America, has put a ligature on this vessel; and for a time the patient appeared to be doing well; but he afterwards died. The operation did him much credit: few would have dared to perform it; and those who might have dared, probably would not have known how. Dr. Mott is an excellent anatomist, and an industrious man.

ANEURISM OF THE DESCENDING AORTA.

When the descending aorta is the subject of aneurism, in its course through the posterior mediastinum, it very often breaks into

the œsophagus, as in the preparation before me (pointing to one on the table), and a similar instance of which may be seen in the museum of the other hospital; when an aneurism presses on the œsophagus, adhesion of the coat of the sac to the œsophagus takes place, and afterwards an opening between the aneurismal bag and gullet is formed; the patient vomits a considerable quantity of blood, and soon dies. I have seen three instances of this kind of aneurism in persons who have died of some other complaint.

ANEURISM OF THE ABDOMINAL AORTA.

When the aneurism is situated above the cœliac artery, a pulsation may be distinctly felt at the scrobiculus cordis; and a symptom which distinguishes this complaint is, that the pressure on the stomach caused by the aneurismal bag produces nausea and vomiting, and small quantities of food are immediately rejected. There was a case in this hospital of aneurism just above the cœliac artery, where the patient had frequent vomiting, constant nausea, and could not bear to take any food. When the aneurism is lower down in the cavity of the abdomen, it often bursts into the intestine. Here is a specimen (holding it in his hand), where there is an opening in the jejunum and the fore part of the aneurismal tumour, of which the patient died. It was taken from a near relation of an eminent physician. Dr. S. brought him, in order that I might give my opinion of a pulsation in the abdomen; he dined with me, we made as light of it as possible, and he was very cheerful at dinner; three weeks afterwards I was sent for, to Henley, to visit him; he was seized with discharge of blood by stool; he revived a little, and hopes of recovery were entertained by his friends; the following morning, however, the discharge of blood returned and he died suddenly.

Symptoms.

Sometimes bursts.

Case.

When the aneurismal tumour presses on the spine, absorption of the vertebræ takes place, as in this instance (exhibiting a specimen); you will also find a large swelling in the loins; but you must be on your guard respecting this swelling, lest it be mistaken

Absorption of the vertebræ.

Confound with lumbar abscess

for any other complaint. One of the surgeons of this hospital, but who is since dead, had a patient with a swelling in his loins; this the surgeon took for lumbar abscess; he took out his lancet, and introduced it obliquely, when some florid blood issued by the side of the instrument. Adhesive plaster was put to the wound, and it healed; he died, however, from the bursting of the aneurismal sac internally. On examination it was found that the swelling was from the aneurismal tumour, the lancet had not penetrated into it, but wounded its coats. There is no pulsation to be felt in the loins from those tumours, nor was there any in the case I have just mentioned, and this is owing to the distance of the swelling from the aorta; thus men that are well informed in their profession may commit mistakes in these obscure cases.

Appearing at the ischiatic notch.

Aneurisms form in the cavity of the pelvis, in the ischiatic notch, and under the gluteus maximus muscle; you will be on your guard, therefore, when you find tumours on your nates. A man was sent from Gainsborough to the other hospital with an aneurism or tumour on the nates: I hesitated at first respecting its nature; hemorrhage came on from the bladder, when it was immediately thought that the aneurism adhered to the bladder, and an opening into it had been formed, as it was afterwards found to be the case on examination. This is all it will be necessary to say to you on the subject of internal aneurisms, as the symptoms will vary according to the seat in which the disease may be found; the digestive organs will be in fault at one time, the urinary at another, according to the part on which the pressure of the aneurismal sac may rest; from the variety of symptoms, the diagnosis will of course be found to be difficult.

ON THE SIZE OF ANEURISMS.

Number and magnitude.

The aneurism before me is the largest I ever saw (a beautiful specimen was here exhibited): it begins in the aorta at the emulgent arteries, and extends into the cavity of the pelvis. It contained blood (and I am not exactly certain how much), but of an enormous

weight. Here (showing another specimen) is a popliteal aneurism of considerable size. The greatest number of aneurisms that I have seen in one case is seven, and this specimen on the table was taken from the man to whom I allude. He died of an aneurism at the bifurcation of the aorta; he also had one at the opposite ham, two above it, one in the groin, and two others. The iliac artery had been tied for femoral aneurism, and the patient did well for some time, but afterwards died. This man was a bricklayer's labourer; had been accustomed to mount ladders, and carry weights up great heights; had been in the habit of exercising his lower extremities a good deal: he was not very muscular, and the fatigue of his occupation was more than he could bear.

Local and constitutional.

I may observe here, that some aneurisms are local, and others general; when they occur in the ham, they are frequently only local; but when between the groin and ham, or in the middle of the thigh, you very commonly find disease of other arteries. Therefore, in popliteal aneurism, you expect to find the aorta and larger arteries healthy.

The age at which they occur.

The age at which aneurisms generally occur is from 30 to 50; at that age, exercise is considerable and strength less. In very old age this complaint is not so common. I have seen a popliteal aneurism in a man of 80, four or five years ago, at the other hospital: on this man I tied the femoral artery, and he did extremely well. On a man of 69 I have operated, and that case did well. I saw a boy in this hospital, eleven years old, with aneurism of the anterior tibial artery. The man of eighty is the eldest, and the boy of eleven the youngest, that I have seen with aneurism. It is more commonly met with between 30 and 50, or rather between 30 and 40, than after that time. In cases of aneurism, the age is no objection to the operation.

Sex.

With respect to the sex in which aneurism chiefly occurs, the male is certainly much more frequently the subject of it than the female. I should say that the proportion of males to females is about five to one: and if we take only cases of popliteal aneurism, the proportion of males would be considerably greater. When

aneurisms do occur in females, they are generally internal. Females are rarely the subjects of aneurism in the limbs; the reason of which is, that they do not exert them so much as the other sex. In the course of my practice, taking hospital and private practice together, I have seen about eight cases of popliteal aneurisms in the female. The number of popliteal aneurisms which I have seen in the male is of course very considerable.

ON THE FORMATION OF ANEURISMS.

How produced. It is necessary that you should clearly understand the manner in which aneurism is produced. The first circumstance that takes place in an artery which is about to produce an aneurismal swelling is, that it becomes opaque, and slightly inflamed. A small yellow spot appears in the part where the aneurism is afterwards formed, and there is a slight efflorescence surrounding it. The process of absorption afterwards takes place, and thins the coat of the artery, so that the texture becomes like that of a fine web. At the same time that this takes place, nature begins to set up a process of defence, which is beautifully exemplified in a preparation (it was exhibited to the class) made from the first aneurism which I had an opportunity of dissecting. This was an incipient aneurism of the aorta; you perceive that the coat of the artery has been absorbed, and opposite to the parts absorbed you observe a layer of adhesive matter, by means of which a defence is set up for the coat of the artery, and the progress of the disease for a time resisted. A covering is thus produced by the adhesive inflammation which shuts up the artery, so as to prevent the immediate escape of the blood.

This preparation not only beautifully illustrates this process, but, by holding a candle on the opposite side of it, you will also observe the opacity which I have just described. As the coat of the artery becomes absorbed, the cellular membrane is glued by this matter to the outer surface of the artery. The next substance which becomes absorbed, if it be an aneurism of the ascending aorta, is the pleura, which forms a portion of the aneurismal bag. Then the lungs

become absorbed, and form a portion of the bag; next the intercostal muscles, with the cartilages of the ribs; then the pectoral muscle; and at last the skin itself, forming the parietes of the aneurism, give way, and there is no longer any thing to prevent the escape of the blood.

Every aneurism was formerly supposed to be produced by the dilatation of the coats of the artery; but it has been found that this is not the case. It is generally produced, not by the dilatation, but by the absorption of the coats of the artery. For this knowledge we are indebted to Scarpa, who first accurately explained the mode in which aneurisms are produced. He thought they were always produced in this way; but they are sometimes, though rarely, formed in the way in which they were formerly supposed to be uniformly produced; namely, by dilatation. Here is a specimen of an aneurism of the aorta, in which the pouch is formed by dilatation, the coats of the artery still remaining. Former opinions.

The general cause of aneurism is a diseased state of the coats of an artery, by which it becomes altered in its appearance, and thinner in its texture; but this, although the most frequent, is not the only cause of the disease, for sometimes the artery becomes dilated in its whole circumference, as may be seen by two beautiful specimens in our museum. Cause of aneurism.

Aneurisms are now and then the effects of the bursting of an artery, under some considerable exertion. I have known two instances of this kind. A gentleman who was out shooting, jumped over a ditch, when, on reaching the other side, his foot slipped, and he fell back into the ditch. At this moment he felt something snap in his ham, and when he attempted to walk, he found himself lame from the accident. He was attended by Mr. Holt, a surgeon, at Tottenham, and was afterwards brought to town, where he underwent an operation for popliteal aneurism. In this case, the aneurism began to form within a very short time after the accident, and it was not more than from three to five weeks afterwards that the operation was performed. Bursting of an artery. Case.

The other case in which I have known an aneurism produced by Case.

the bursting of an artery, occurred as follows:—A gentleman whom I was attending for another complaint, in attempting to raise himself in bed upon his hands, felt something snap in his right hand. When I next visited him, he told me the circumstance, and requested me to look at his hand. Upon putting my finger upon it, I felt a pulsating aneurismal swelling. I tried what could be done by pressure; but as this did not succeed, I found it necessary to tie the radial artery at the part where we usually feel the pulse. In this case, a bag of considerable size was formed by the cellular membrane, instead of the usual mode.

Aneurism from a puncture.

A pointed body introduced into an artery will produce all the appearances of aneurism, and require the same treatment. In whatever way, in short, aneurism is produced, the surgical treatment of it will be the same.

Dissection of aneurism.

A curious circumstance may be observed in dissecting an aneurism, after having turned back the aneurismal sac. You would suppose that when you had made an incision in the parts, you would immediately find the cavity in which the blood is contained; but this is not the case. On the inner side of the aneurismal sac a wall of adhesive matter is deposited in layers, so as to enclose the blood as completely as the aneurismal sac itself. Here is a preparation in which the aneurismal sac has been taken away, and yet you find a bag remaining entirely formed of layers of adhesive matter on the outer side of the aneurism. The process by which nature throws up one layer of adhesive matter after another, until a complete bag is produced, is beautifully illustrated in this preparation.

Diagnosis.

You may distinguish aneurism from other diseases by the following marks:—If the aneurism be recent, by pressing your finger on the artery which leads to the aneurism, you will empty the aneurismal bag; but if the aneurism be of longer duration, and the pulsation be but slight, place yourself by the side of the patient, observe carefully the size of the swelling, and, by pressing your finger on the artery above, you will see the aneurism sink down as

you make the pressure, though the sac will not entirely empty itself; and upon raising your hand suddenly, you will observe a jet of blood rush into the aneurismal sac, and raise it to its former height.

In this manner an aneurism may be easily distinguished from another tumour deriving its pulsation from an artery: in the former case, the pulsation will be felt over every part of the tumour, in the latter there will be no pulsation, except in the direction of the artery. I have hurried over some parts of this evening's lecture, as it is my intention to show you the operation for popliteal aneurism, having a subject which will answer the purpose extremely well. I shall postpone, therefore, some remarks which I have to make upon the medical treatment of aneurism, and proceed at once to speak of the surgical operation for its cure. Known from tumour.

ON THE CURE OF ANEURISMS.

Aneurisms sometimes undergo a spontaneous cure. This is a circumstance which you should bear in mind, because in cases where they are so situated as not to admit of surgical relief, it is a consolation to the patient to know that these diseases now and then cure themselves. There are many examples of such a spontaneous cure: I have myself seen some, and many more are to be found in surgical and medical authors. Spontaneous cure.

There is a preparation before us, taken from a man in the other hospital, who had an aneurism, situated just below the groin, which underwent a spontaneous cure. He was sitting before the fire, in one of the wards of the hospital, when he felt something burst in the upper part of his thigh. On examination, he found no blood had issued out, and, in fact, the aneurism had not yet reached the skin so as to be adherent to it. His thigh was, however, enormously swollen; he was unable to use the limb, and was put to bed by the other patients. For three days after a pulsation was found in the aneurism; it then ceased, and the size of the limb began to diminish. At the end of four months the aneurismal swelling had considerably Case.

diminished, and he recovered the use of the limb. Six months after he first felt this sensation, and when he had been discharged from the hospital, I met him as I was walking across the square of the other hospital, I said to him, "Why, Powell, you seem low-spirited; you ought to be cheerful, for you have had a very narrow escape." "Yes," said the man, "I am pretty well, sir, except that I have something alive in my belly." "I hope you have," said I, "for it would be rather awkward if you had not." On putting my hand on his abdomen, I felt a pulsating swelling there. This aneurism shortly afterwards burst into the abdomen, and the man died. On examination of the body, it was found that the aneurism in the thigh, just below Poupart's ligament, had burst under the fascia lata; a great accumulation of blood took place, which pressed upon the vessel, and the femoral artery was obliterated. Sir W. Blizard had a patient at Walworth, with popliteal aneurism, which was cured spontaneously. Mr. Ford mentions several cases; and Dr. Baillie met with two cases of carotid aneurism, which cured themselves. Mr. Crampton, the surgeon-general at Dublin, has given an account of a case in which the aneurism gradually wasted in the abdomen, and obliterated the aorta.

An account of a similar case has been given by Baron Larrey, the French surgeon. An Irish gentleman, whose name does not at this moment occur to me, in passing through this metropolis, on his way to Paris, showed me a preparation from a case of spontaneous cure of aneurism, in which the aorta was obliterated at the loins.

Medical treatment.

From the medical treatment of this disease, I must confess that I have seen but little advantage. Mr. Brown, a surgeon, who had an aneurism of the aorta, was exceedingly strict in his diet and in his exercise; but he lived only a very few months. A gentleman, who had an aneurism of his aorta, took four ounces of food three times a day, and refrained almost entirely from exercise; and although he began this plan in August, almost as soon as the disease was distinctly discovered, yet he died in the following February. The result of my observation is, that two measures only

are useful; the one, abstraction of blood from the arm, when the pulse is hard and full, from which I have seen undoubted benefit arise. The other, the administration of the carbonate of soda, in considerable doses, which, with entire rest, seem to prevent the increase of the swelling: but the soda is at last obliged to be abandoned, on account of its producing petechiæ; the irritability of the body is often so increased by an anti-phlogistic treatment, that the quickness of the pulse which follows, does as much injury as the natural force of circulation.

As the spontaneous cure of this disease, however, cannot be so far depended upon as to prevent us from performing the operation in all situations where the artery is accessible, I shall proceed to describe to you the mode of performing the operation in the different parts of the body, confining myself in this evening's lecture to the operation on the femoral artery. As we are occasionally under the necessity of performing the operation as it used to be done thirty-five or forty years ago, I shall, in the first place, say a few words on the old operation. On the operation for aneurism.

The operation for popliteal aneurism used to be performed in the following manner:—A tourniquet was placed on the limb, and the patient laid upon his face. An incision was then made in the ham, to the extent of the aneurism, and the adhesive matter and coagulated blood removed from the excavation thus made. The aneurismal bag was then wiped out with a sponge, and the tourniquet was slightly loosened, in order to mark the orifice of the artery. The surgeon stood ready with a probe in his hand, and as soon as he saw the blood issue from the upper orifice, he passed it into the artery, and then separating that portion of the artery from the remaining parts, put a ligature upon it. When he had done this, he again loosened the tourniquet, and as soon as he saw what appeared to be venous blood spring from the lower portion of the artery (for the blood from the upper portion of the artery is florid, as arterial blood usually is, but in the lower portion it has the appearance of venous blood), he introduced the probe into the orifice, and put a ligature on the artery as before. An operation like this, Old method.

which exposed a very considerable surface, where the artery in the vicinity of the aneurism was diseased, and by which the bones were frequently injured, from the ulcerative process taking place, necessarily led very frequently to fatal results; so frequently, indeed, that it was a disputed point among the profession whether it was better to amputate in cases of popliteal aneurism, or to perform this operation. A man who had recovered after the old operation for popliteal aneurism could, formerly, get money by showing himself at the hospitals; at present it would not be worth a man's while to beg in this way.

Improved by Hunter.

It is to the transcendant talents of that immortal genius Mr. John Hunter, that we are indebted for the great improvement which has taken place in this branch of surgery. But for Mr. John Hunter, we might still have the same difficulties to encounter, and patients labouring under this disease might still have been exposed to the same danger. Mr. Hunter being an excellent physiologist, and an admirable anatomist, applied the powers of his active and inquiring mind to this subject. He said, "I have frequently tied the femoral artery in animals, without injury; why should not I put a ligature on the artery, in the same way, in the human subject?"

Hunter's first efforts.

It is right, however, to observe that Mr. Hunter was led to this train of thought by having under his care a case of popliteal aneurism, of such extent as to have reached the tendon of the triceps, so that there was no room for the application of a ligature between the aneurismal sac and the tendon. He determined, therefore, to make the experiment of tying the femoral artery, rather than amputate the limb. The first operation was not, as might be expected, performed in the very best manner. He was not content with a single ligature, but applied several, which were left hanging out of the wound, and which were afterwards discharged by a process of ulceration. Yet under all these disadvantages, the patient recovered, and lived rather more than twelve months after the operation. On dissection, it was found that the femoral artery was obliterated as far as the arteria profunda. Since Mr. Hunter's time, several slight alterations have been made in the operation for

popliteal aneurism, as every surgeon has his whim; but the principle established by Mr. Hunter remains the same, and that great surgeon has the undoubted merit of having substituted a simple and beautiful operation for one of very considerable difficulty and danger.

The operation for popliteal aneurism described.

I shall proceed to point out to you the several steps of the operation for tying the femoral artery in cases of popliteal aneurism. Mr. Hunter used to make the incision in the middle of the thigh, but experience has shown that it is better to make it one-third of the space downwards from the ilium to the internal condyle of the os femoris, because the artery is more deeply seated in the middle of the thigh than it is higher up; and there are, besides, many anastomosing vessels in the former situation. There are four steps in this operation: first, an incision through the skin, which lays bare the sartorius muscle; secondly, the division is to be continued along the inner edge of the sartorius, exposing the sheath of the femoral artery; thirdly, the incision through the sheath; and fourthly, the putting of the ligature round the vessel. I now make the incision, about four inches in length—[the learned professor proceeded to perform the operation on the dead subject]—which completely exposes the sartorius muscle; I then separate its inner edge from the parts with which it is in contact; this lays bare the sheath, and I now find the femoral artery and the vein exposed. There is a little septum between the artery and the vein, which you should take care to observe. Introduce the aneurismal needle under the artery, taking care to disturb the parts as little as possible. Separate the cellular membrane to the extent of about an inch; and take care not to include the saphena nerve, which is a small branch of the anterior crural nerve, in the ligature. If the saphena nerve should be taken up, you will ascertain it by the irritability which is immediately excited. Having brought the ligature under the vessel with the aneurismal needle, all that remains is, to tie it with what is called a surgeon's knot, which does not slip. In this consists the whole operation. If you should have separated the artery from the sheath to any considerable extent, two ligatures will

be necessary, which must be applied close to the part where the vessel is connected by the cellular tissue to the sheath; but if you should not have disturbed the artery, one ligature will be sufficient.

LECTURE XXI.

OPERATION FOR POPLITEAL ANEURISM.

Medicinal treatment.

As the time of last evening was occupied in performing the operation for popliteal aneurism, I left one or two points unnoticed which it will be important to bear in mind, therefore I will state them now. In the first place, it has been conceived that considerable relief might be afforded in cases of aneurism, by medical treatment. It is natural to expect that if by any means the action of the heart and arteries be diminished, the result would be that the aneurismal bag would yield less, and consequently be reduced: experience does not, however, justify this conclusion. I will tell you a case which exemplifies the truth of what I state.

Case.

A gentleman came to town, and was operated on for popliteal aneurism; he recovered in the usual time, no untoward circumstances occurring during his recovery; in twelve months afterwards, he became afflicted with aneurism of the aorta, just at its curvature. He came to London, and having been under my care before, he applied to me again. On examination I discovered the aneurism. A consultation was held on this patient in July, when it was agreed that he should be kept low, be occasionally bled, and be allowed small quantities only of animal food, as it was hoped that by this means the action of the heart and arteries would be considerably lessened. Well, this regimen was prescribed in July; the patient adhered very rigidly to it; but the February following he died, from the bursting of the artery into the chest, having lived a shorter period than usual in these cases. Now it is probable that he would

have survived longer, had he been treated otherwise; and I will explain to you how it is that keeping the patients so low does not agree with them; by keeping them so low, the constitution is rendered irritable, and then whatever is lost in the momentum of the circulating fluid, is gained in velocity. I have seen loss of blood in the treatment of aneurisms occasionally useful. When the chest is affected, and breathing laborious, it will be right to take blood; and the best state in which the body can be kept is a little below par; that is, a little under the natural state. Strict attention must be paid to regimen; and it would be highly improper to give stimuli of any kind.

Cure by pressure.

The second point is the chance of obtaining a cure by the application of pressure on the artery or aneurismal bag. Very many years ago, I had an iron ring made, with a pad on the outer side, and a screw on the opposite: this was put on the limb, pressure on the outside was made against the thigh, and on the inside against the artery; the use of this was worse than the operation. I applied it on a man at the other hospital, and I will tell you how long he kept it on—twenty-four hours only. In three hours from its first application he began to complain of pain; in a few hours afterwards it became worse; and in less than twenty-four hours the man said that he would submit to any operation rather than suffer the pain: therefore it is impossible to practise it. I have tried the same experiment on the upper extremity, but without its leading to any useful results. This plan of pressure on arteries does not succeed, and therefore ought to be abandoned.

Later improvements.

Well, gentlemen, I will describe the alterations which have taken place in the mode of performing the operation for popliteal aneurism since the time of Mr. J. Hunter. Mr. Hunter made the incision in the middle of the thigh; the spot where it is made at present is one-third down, as in the middle of the thigh the artery is deeper situated; well, therefore, one-third down the thigh is the place where you ought to operate. Now, Mr. Cline (with whom I formerly lived) thought that it would be an improvement in the operation, if, instead of allowing the ligature to remain till the

process of ulceration had begun, he removed it before that period, that hemorrhage might be prevented, and the operation rendered simple; and in the first case of popliteal aneurism which he had after he thought of this plan, he tried the experiment, laid bare the artery, applied a broad ligature, and tied it firmly on the artery; but in order to prevent the knot slipping, he put between it and the vessel a small piece of cork. The first case on which he tried this, succeeded perfectly well. [Here the learned professor, pointing to a specimen taken from the man on whom this experiment had been tried, showed that the artery was quite obliterated.] The ligature remained on till the adhesive process had begun; but before ulceration had taken place, the wound suppurated, and ultimately closed. The patient died some time after of an affection of the lungs; and on examination of the body, the artery was found as just described; but on repeating this mode of operation, it was soon ascertained that it produced more irritation than the other. Here is an example (pointing to a specimen), in which the artery ulcerated a short time after the broad ligature had been applied; it led to great irritation, and the process of ulceration was rendered more speedy; therefore the operation cannot be performed; and Mr. Cline, with all the candour for which he is so remarkable, gave it up, as an operation, however feasible, yet one that was attended with considerable risk.

Mr. Abernethy's method.

Well, then, it has been proposed, and very ingeniously, by Mr. Abernethy, that two ligatures should be applied, and the artery divided between them. Now this idea arose from the circumstance, that where the ligatures are applied to arteries after limbs have been removed, no hemorrhage comes on; but the two cases essentially differ: in the one, where amputation has been performed, retraction of the artery, before the application of the ligature, has taken place; it is already drawn into the cellular tissue, and there is no danger of after hemorrhage from its retracting any more: but in the other, where ligatures are applied on arteries for the cure of aneurisms, as soon as the process of ulceration commences, hemorrhage often ensues from the retraction of the vessel, which

had not taken place before. I had a case in the other hospital, which was going on well to the fifteenth day, when, as he was lying on the bed, a sudden rush of blood occurred, and had there not been a dresser in the room at the time, he must have died; ligatures were applied a second time. If an artery is whole when the ligatures are applied, separate it from the cellular membrane sufficiently to allow of retraction: but if the artery is divided, as after amputation, there will be no occasion, as the vessel has already retracted before the ligature is applied, and this is the reason that there is less danger from hemorrhage when one ligature only is applied, than when there are two.

Mr. Cline's experiments.

But this operation led to another dangerous consequence—there was the danger of the slipping of the knot. Mr. Cline, senior, in the operation for popliteal aneurism, put on two ligatures, and whilst the dresser was sitting by the patient, hemorrhage came on; the tourniquet was instantly applied, and Mr. Cline sent for: when he came, on looking into the wound, he saw one of the ligatures loose, and floating in the blood. On examination, he found that the ligature had escaped from the upper part of the artery, and that the lower one had nearly slipped. He immediately applied two fresh ligatures. Therefore there is the danger of the knot slipping where there are two ligatures used; and on this account it has been recommended that a needle should be put through the artery, with a fine ligature in it, as by this means the danger from hemorrhage would be prevented.

Dr. Jones's method.

It was found by Dr. Jones, who has written an excellent work on the methods nature adopts in restraining hemorrhage, that if fine ligatures were applied on arteries, they would cut through the internal coat, and leave the external undivided; the elastic coat would remain whole. He tried experiments on animals, and from these he learnt that, when fine ligatures are applied, inflammation takes place, and the adhesive process is, in a very short time, produced, by which means the canal becomes obstructed; he therefore recommended, that in operation for aneurisms, fine ligatures should be applied only for a few hours, and then removed.

Experiments.

In consequence of this, I adopted the plan in the case from which I took this specimen (pointing to one on the table), in order to see if it would succeed; it has been tried in the following cases, and is an operation that ought not to be performed. In the first place, a fine ligature was put on the femoral artery, tied tightly, and in a few hours removed; the result of the operation was, that the pulsation was stopped for a short time, but in a few hours it returned, and the size of the aneurism began to increase. A consultation was held, and it was determined that a ligature should be applied in the usual way, and allowed to suppurate and ulcerate, and the patient did extremely well. In two other persons I tried this plan; one for an aneurism on the popliteal artery, the other for an aneurism on the radial artery: in the first case I used a fine thin ligature, and tied it very tight; in thirty hours I loosened it. Now, when this man was on the table, I said to myself that the operation was not founded on a right principle. I looked at the wound and saw that the adhesive process had commenced, and that in drawing the ligature out, I had destroyed all the adhesions which nature had set up: the pulsation had not ceased, and I pulled the ligature tight, and allowed it to remain forty-two hours longer, and then removed it; thus, after the lapse of seventy-two hours in the whole, it did not return. Thirteen days after this, as I was coming into the square of the other hospital, one of my dressers said that hemorrhage had come on from the man in Job's ward, from whom the ligature had been removed, and that it was evidently arterial. I said that this was exceedingly curious. I went up, and found that it was the case; a tourniquet was applied; the hemorrhage did not return, and the patient did extremely well. If the ligature, after being on for seventy-two hours, does not produce adhesion, the uselessness of *temporary ligatures* does not admit of a doubt—*they ought to be abandoned.* In the aneurism of the radial artery, I removed the ligature twenty-four hours after it had been applied, but the pulsation returned; I made an incision on the tumour, and applied a ligature above and below, and the aneurism was cured.

Trials of various ligatures.

It would be an extremely desirable thing if any person invented

a ligature composed of materials which would admit of solution: he would, by such an invention, greatly serve his profession. It has been said, that ligatures formed out of the untanned skins of kids will answer such a purpose; that they will become absorbed; but they do not, I understand, succeed. I thought that a ligature made of catgut would admit of solution, and I tried it on a man of eighty years of age, on whom I performed the operation for popliteal aneurism: the catgut ligature was cut close to the vessel; the wound healed over, and no bad symptom followed. The experiment succeeded, it is true, in this case; but I have used the catgut ligature in three other cases since, and did not find it at all superior to the common ligature: in each of the three cases, it came away by suppuration and ulceration, as in common cases; it did not therefore succeed. In the old person there was less tendency to inflammation, and that was the reason of it succeeding.

Experiments on dogs.

I made some experiments on dogs, with a view to ascertain the solubility of catgut. I tied the carotid of a dog, and used the catgut ligature; in a fortnight after I killed the animal, and found that the ligature had not been dissolved, but that it had cut through the artery, and was situated in a cyst, like that which is formed round a ball, between the divided ends of the vessel, in a quiescent state; therefore this substance does not admit of solubility, but will remain sometimes without producing irritation. On the whole, catgut ligatures are not at all superior to the common ones. Some animal matter of the form of gluten, made into ligature, might do; but this is mere conjecture. At present there is no ligature known which is capable of being dissolved and removed by the absorbents.

The mode of ligature.

Well, gentlemen, I have made all the observations respecting the improvements in the operation for popliteal aneurism that I intended, with the exception of the plan of cutting the ligature close to the knot, and then leaving it to its fate, and to come away as it can; but experience shows that the irritation which is produced by this mode is attended with great mischief. This is the plan Mr. Hunter adopted, when he put the ligature for the first time on the femoral artery, in operating for popliteal aneurism; the wound closed

kindly, and the ligature afterwards came away by suppuration and ulceration. Since Mr. Hunter's time it has been tried again, but is now nearly given up by all in the profession.

Present mode.

On the whole, rest assured, that the best mode of applying the ligature is that now commonly adopted; tie a tight knot with a fine ligature, and then cut one end of the ligature close to the vessel, and let the other hang out of the wound. If, in the operation, the artery has been disturbed much from the surrounding cellular membrane, for an inch or so, apply two ligatures, and divide the artery in the centre, and there will be room for the retraction of the artery; but if, on the contrary, it has not been much disturbed, apply only the single ligature; broad ligatures must, however, on no account, be used, as they are very likely to produce constitutional irritation, and consequently cause the parts to suffer for a great length of time.

After treatment.

When the operation is performed, what you should do is this: you are to bring the integuments close together by means of strips of adhesive plaster, leaving, however, a small space between each, so that the matter may escape through the interstices. No bandage, or roller of any sort, should be applied, as the blood-vessels of the limb would be compressed by them, and injury be done to the part. As for the position of the limb, it should be placed on a pillow, and on its outer side. If the patient were to rest on his heel, two evils would be likely to arise; first, there would be the necessity of supporting the knee by placing something under the ham which would stop the circulation in the vessels of the part; and, secondly, there is danger to be apprehended from gangrene, from the heel resting long in one position, as this is apt to produce sloughing of the parts. The outer position, then, is the one you should choose, occasionally changing it, so as to prevent pressure in any one particular part.

Warmth necessary.

Be on your guard, gentlemen, to preserve the warmth of the limb, for there is danger from gangrene in cold weather. Some years ago, I was very near losing a patient by not attending to this circumstance. A young gentleman on whom I had performed the

Case.

operation for aneurism, complained when I visited him (which was in the evening of the same day) of a weight in the foot: this induced me to look at the limb, which probably I should not otherwise have done, and I found that the foot was quite cold and benumbed, which was occasioned by there being no fire in the room at a time when the weather was very cold. I sat down by the bed-side of the patient, and kept rubbing his leg and foot with a warm flannel till heat was restored to the limb. Ever since that time I have wrapped the limb up in a piece of flannel or a stocking, and sometimes put jars filled with hot water to the feet, particularly if the weather is cold, then the part will be preserved gently warm.

A dresser's ignorance exposed.

I once saw a patient lost by the folly of a dresser at the other hospital. In the evening after the operation, seeing the limb a little swollen, he said to the sister, "Suppose you apply the white wash (liq. plumbi. super. and water) to this?" On the following morning gangrene came on, in consequence of the cold produced by the evaporation; power of the circulation in the limb became destroyed, and the patient died.

Circulation maintained.

The means by which the circulation is carried on when the femoral artery is tied is by the arteria profunda; from this, anastomosing vessels are sent off, which communicate with branches from the anterior tibial.

Aneurism reproduced.

It sometimes happens that the aneurism will be reproduced by means of a vessel which comes off above the part where the ligature is applied, and enters the artery just above the aneurismal sac, and thus reproduces the aneurism. I scarcely should have mentioned this to you, if I had not seen an instance of this a short time ago, in a man at Guy's, who had been operated on by Mr. Key for popliteal aneurism, and who was discharged cured. This person came back to the hospital with another swelling in the ham, and a pulsation in it, in the same spot as the former aneurism: he had suffered considerable pain; the integuments of the knee were very rigid, and the bone, from the long-continued pressure on it, had become in a diseased state. I amputated the limb, and found the aneurism reproduced of the original size, and an artery could be distinctly traced going from a little above the tumour up the thigh.

It therefore happens that aneurisms are reproduced by means of arteries which proceed from above the spot where the ligature is applied, to just above the aneurismal sac: these cases are, however, extremely rare.

Separation of the ligature.

The time at which the ligature separates is generally from the twelfth to the fourteenth day; the fourteenth day is generally the extreme; the twelfth day the minimum of separation; but it is variable according to the different kinds of ligatures used. I have seen a ligature remain on as long as twenty-eight days, where a broad one had been used; I have known a ligature come off as early as the fifth day, but in this last case it was put on the brachial artery for a puncture made in bleeding; on the eighth day it had come off, and no hemorrhage ensued; therefore, if early inflammation ensues, the separation will be repaid; but if there be a broad ligature, and the inflammation indolent, it will be from twenty-five to thirty days. Here let me give you one or two practical hints. If the ligature comes away, and without any hemorrhage, you will think the patient safe: he is not so by any means.

Case of a sailor

A man was pushing a knife through a cable, when it slipped, pierced the left thigh, and wounded the femoral artery; a tourniquet was applied, the best that could be made, for the accident happened on board a vessel in the river; he was brought to Guy's Hospital, and I was sent for. On my arrival, I found the knife had perforated the artery, and therefore applied a ligature above, and below the vessel; on the fourteenth day, they separated, about nine in the morning, I believe; about twelve he began to wash and clean himself, and soon after a jet of blood took place. I was sent for, applied other ligatures, and he was obliged to keep his bed nearly as long as before, though I think the ligatures separated a day or two sooner. When they separate, therefore, be on your guard, and let the patient remain quiet two or three days afterwards.

Aneurism of the anterior and posterior tibial arteries.

The operation which has been shown to you, gentlemen, for popliteal aneurism, is the one used for aneurisms of the anterior and posterior tibial arteries, situated at the upper part. I saw Mr. Lucas, the father of Mr. Lucas, the late surgeon at Guy's, perform

that operation for aneurism of the anterior tibial artery. But this operation is not to be performed when the aneurism in these arteries is near the foot; I have not seen an aneurism of the posterior tibial behind the inner malleolus, but I have of the anterior tibial on the front of the foot. I saw Mr. H. Cline, in an aneurism of the anterior tibial, cut down on the tumour, and apply a ligature just above it, but it did not succeed. In these aneurisms, you must make an incision on the sac, and apply a ligature both above and below it. The femoral artery sometimes forms an aneurism just opposite, the hip joint and below Poupart's ligament. I have also seen it at the origin of the arteria profunda; but if the aneurism be placed any where between the groin and the middle of the thigh, it would be better to tie the external iliac artery. Inguinal aneurism.

LECTURE XXII.

ON THE TYING OF ARTERIES.

We are, this evening, gentlemen, to consider the subject of the taking up of the arteries, in the different parts of the body, for aneurism.

THE APPLICATION OF A LIGATURE ON THE EXTERNAL ILIAC ARTERY.

It is not at all an uncommon occurrence to meet with an aneurism of the femoral artery just below Poupart's ligament, of which here is a specimen (pointing to one on the table), exactly similar to the aneurisms which occur in the ham. Now, with respect to recurring to the operation in this complaint, I have performed it in nine different instances for aneurism of the femoral artery: one of those persons was a surgeon, who has since married, and is extremely well. The mode in which the operation is performed is as follows:— The operation described.

First incision.

[There was a subject on the table during the whole of the lecture, on which the learned professor showed each operation.] I do not make a straight incision in the course of the artery, but one of a semilunar form. I begin the incision a little above the abdominal ring, and extend it, in the shape of a crescent to the edge of Poupart's ligament, and then continue it to about an inch and a half from the inner side of the spine of the ilium, where it terminates. By this incision I lay bare the tendon of the external oblique muscle; in the second I divide this tendon, and expose the internal oblique and transversalis muscles. Having arrived at this step of the operation, there will be no occasion to make any further use of the knife. The next step will be to raise the internal oblique and transversalis muscles from Poupart's ligament, by introducing the finger behind them. Well, having done this, you reach the passage of the spermatic cord, and you feel it distinctly; and then behind this the pulsation of the iliac vessel. You now draw up the internal oblique and transversalis muscles with the finger, at the same time elevating the spermatic cord a little, and then carry the finger into the abdomen, behind the peritoneum, and you ascertain the beating of the iliac artery. Having found the artery, I put the aneurismal needle into the opening, and introduce it under the vessel. You will recollect that the artery is accompanied by a vein, and that the vein is on the inner side; the artery on the iliac, the vein on the pubic side; the operation may be performed without the least difficulty, and is as easy as tying the femoral artery; there is only one circumstance that occasions the least danger; and that is the epigastric artery passing up from the pubic side of the iliac vessel, and on the inner side of the incision; but this, however, may be avoided. I will clean the artery a little from the surrounding parts, and take it up; it is very desirable to ascertain that the vein is not secured, because the interruption to the return of blood would be very injurious; if the artery should be exposed as much as it is on the subject before me (an inch and a half), two ligatures must be employed, but if a small portion only of the vessel is laid bare, a single ligature will be all that is required. When you use two

Situation of the artery.

ligatures, you will separate them from each other, drawing one upward, and the other downward, and leaving about three-quarters of an inch of the vessel exposed at the extremity of each ligature: for if this be not done, on dividing the artery, there will be danger of the ligature slipping off; the instrument with which the artery is usually divided is the probe-pointed bistoury; when it is done, retraction of the vessel immediately takes place; there will be no danger of including the nerve in the ligature, as the anterior crural does not accompany it: the vein and artery are included in the sheath, and the nerve is on the outer side. Now the edges of the wound are to be brought together, strips of adhesive plaster are to be applied, and the ligatures are to be allowed to come away by suppuration and ulceration.

How the circulation is carried on.

Here is a curious specimen (exhibiting a preparation) showing the mode in which the circulation is carried on after the external iliac has been tied; the limb has been injected, and the anastomosing vessels are distinct; you also see the part of the iliac artery where it was tied. If, then, you were asked what carries on the circulation after the external iliac has been tied, your answer would be—the gluteal principally; this passes out through the ischiatic notch, comes over the ilium to the groin, and enters the femoral artery, a little below Poupart's ligament; the second artery is the ischiatic; it arises from the termination of the internal iliac, passes out of the pelvis between the trochanter major and tuberosity of the ischium, to the back of the thigh, and sends a few branches to the arteria profunda and external circumflex arteries; the third artery is the obturator, it passes out through the obturator foramen, and joins the internal circumflex artery; also the external pubic communicates freely with the internal pubic; therefore, if asked by what vessels the circulation is carried on after the external iliac has been tied, you would say, principally by the gluteal.

ON SECURING THE INTERNAL ILIAC ARTERY.

An operation of extraordinary difficulty; it has been performed

by Mr. Stevens, of the West Indies, and since by two other individuals, one of whom was Mr. Atkinson, of York, for the purpose of securing the internal iliac artery. None but a man endowed with the knowledge which Mr. Stevens possessed would have dared to undertake such an operation; but Mr. Stevens was educated by Mr. Burns, of Glasgow, an enterprising man, and a most excellent anatomist. He was brought up in his dissecting room, and this it was that led Mr. Stevens to the idea of doing it.

The operation described.

The operation consists of making an incision on the inner side of the spine of the ilium, by which you cut through the abdominal muscles, and reach the peritoneum, which you turn to the opposite side, in order that the artery may be reached. Now, in this operation there is considerable difficulty in separating the ureter from the artery, because it crosses just at the bifurcation of the iliac artery, and if a man had not been well acquainted with the anatomy of the part, as Mr. Stevens was, he might include the ureter in the ligature, and thus cause destruction of life. I put the ligature round the artery (the learned professor continued showing the operation on the dead body), that you may see it is the internal iliac which I have secured; I would not, however, have ventured to perform this operation, if it had not been performed by another; I should have doubted my own powers and skill. It is an operation highly creditable to any one who performs it, but particularly to him who first attempted it.

In what case it should be done.

In what case then, would a surgeon be called on to perform this operation? Why, for an aneurism of the gluteal artery, just at its commencement, so that it cannot be reached under the gluteal muscle; the operation must be performed in the manner I have just shown you.

TYING THE AORTA.

Case of tying the aorta.

I was sent for one day to go to the other hospital to see a man with violent bleeding from just above the groin, in consequence of a rupture of the external iliac vessel high up; the man had long been a patient there; the integuments had sloughed, and the patient

was exceedingly reduced from loss of blood. Under these circumstances, I thought myself justified in performing the operation of tying the aorta; for this step I have been greatly abused, but abuse, gentlemen, does no injury; it shows a malicious and bad disposition on the part of those from whom it proceeds, and on a man possessing the *mens conscia recti* it will have no effect, unless he be destitute of common sense. I was situated as I have just described, when I tied the aorta; I knew that the aorta had been obliterated within the chest, and that the circulation had been carried on by the intercostal arteries going from above to just below the spot where the aorta was obliterated: the insides of the ribs are covered with numerous vessels. A gentleman of Dublin had a preparation, in which the aorta had been obliterated in the abdomen; and in this case the circulation was carried on by the lumbar arteries going from above to below the part where the vessel was obliterated; I had not the least doubt but that if the aorta was obliterated, anastomosing vessels would carry on the circulation, on the same principle as in any other part of the body; the greatest danger is not from gangrene when the ligature is applied on the aorta, nor is any thing to be apprehended, as far as regards the carrying on of the circulation; but the danger consists in including the nerves, as I will presently show you.

Experiments on dogs.

Here is a specimen of a dog (pointing to one on the table), in which the aorta has been tied, and the circulation was carried on by the lumbar arteries; it is a very easy operation on the dog, and any one may perform it. I will tell you how you should do it; you must make an incision on the side of the transverse processes of the lumbar vertebræ, cut through the muscles and peritoneum, and then you may easily carry the aneurismal needle under the vessel, and bring it out of the wound, in order that you may see that you have not included the aortic plexus: if this be secured in the ligature, a paralytic affection of the lower extremities will be produced: now I wish particularly to state this, as I believe it to be entirely new, and that nothing new has been said on this

subject in books. In the two first animals on which I performed this operation, I thought the paralysis was owing to the interruption of the circulation, but on repeating the experiment, I found it was produced by including the aortic plexus. If the aorta be well cleaned, and a ligature applied, and the vessel be returned to the abdomen, the dog runs about as if nothing had been done to it; and in five minutes after, it will eat bread out of your hands, if it has been previously accustomed to it. The operation, I repeat, is exceedingly easy, and a boy may perform it. Well, after you have done this, wait a short time, kill the animal, and inject the arteries, you will find that the lumbar vessels on the inner side of the abdomen, and fore part of the spine, had carried on the circulation. The reason of the paralysis in the case I have just alluded to was, that the aortic plexus was included, and the result was the destruction of life. Unfortunately, however, in the human subject you cannot make your incision near the spine, but must do it in the fore part of the abdomen to get at the aorta. If a case were to offer itself, similar to that I have told you of, I would immediately perform the operation again; and my own conviction is, that it can be done, and with success. At the time I tied the aorta, the patient appeared dying; after the operation had been performed, I was pleased in a remarkable manner to see him in the evening sitting up in bed, adjusting his clothes; if the vessel had not been secured when it was, he would not have lived an hour. On the following morning, signs of constitutional irritation came on, in the evening he became much worse, and in forty hours from the time of the operation he died.

Dissection.

No peritoneal inflammation, but at the edges of the wound, which were glued together by adhesive matter, excepting at the part where the ligature protruded. The thread had been passed round the aorta, about three quarters of an inch above its bifurcation, and rather more than an inch below the part at which the duodenum crosses the artery: it did not include any portion of the omentum, or intestine. Upon cutting open the aorta carefully, a

clot of more than an inch in length was found to have sealed the vessel above the ligature: below the bifurcation, another, an inch in extent, occupied the right iliac artery, and the left was closed by a third, which reached as far as the aneurism: all were gratified to observe the artery so completely shut in forty hours. The aneurismal sac, which was of a most enormous size, reached from the common iliac artery to below Poupart's ligament, and extended to the outer part of the thigh. The artery was deficient from the upper to the lower part of the sac, which was filled with an immense quantity of coagulum. Here is a specimen, (the learned professor exhibited the aorta, which he tied,) in which you see a coagulum above and below the spot where the ligature was applied, sealing the extremities of the artery.

The operation described.

Now, gentlemen, if I should perform this operation again, the only difference that I would make, would be to cut the ligature close to the vessel, where it should take its chance, either to become encysted or absorbed. I commenced the incision in this operation in the linea alba, two inches above the umbilicus, and carried it to the same distance below, taking care, in my descent, to avoid the umbilicus, by giving it a semilunar turn or curve. I was astonished to find with what ease I could pass my finger down to the artery. However great the apparent difficulty of performing this operation, there was in reality none. The principal danger appeared to arise from the irritation produced in the intestines by the ligature, and that is the reason why I should cut the ligature close to the vessel. During the operation the fæces passed off involuntarily, and the patient's pulse, both immediately and for an hour after the operation, was 144 in a minute. I applied my hand to his right thigh immediately after the operation, and he said that I touched his foot, so that the sensibility of the leg was very imperfect. Time will show us whether this operation will be successful or not. I know, for my own part, that I would not hesitate to have my own aorta tied, if it would save my life for only forty hours.

ANEURISM OF THE CAROTID.

I have twice performed the operation of tying the common carotid on account of the existence of aneurism; and as both these are already published in the Medico-Chirurgical Transactions, it will be only necessary to give a short account of them here, and of the mode in which this operation is to be performed.

Case. The first case is that of Mary Edwards, æt. 44. The swelling occupied two-thirds of the right side of the neck, pulsated very strongly, and the integuments at the most prominent part of the tumour appeared very thin. It had existed six months previous to the operation, which was performed as follows:—On November 1, 1805, I made an incision two inches long, on the inner edge of the sterno-mastoid muscle, from the inferior part of the tumour to the clavicle, which laid bare the omo and sterno-hyoideus muscles, which being drawn aside towards the trachea, exposed the jugular vein. The motion of this vein produced the only difficulty in the operation; as, under the different states of breathing, it sometimes presented itself to the knife tense and distended, and then as suddenly collapsed. Passing my finger into the wound, to confine that vein, I made an incision upon the carotid artery, and having laid it bare, I separated it from the par vagum, and introduced a curved aneurismal needle under it, taking care to exclude the recurrent nerve on the one hand, and the par vagum on the other. The two threads were then tied about half an inch asunder, being the greatest distance they could be separated: on account of the short space, I did not divide the artery. As soon as the threads were tied, all pulsation on the tumour ceased, and the wound was superficially dressed.

Immediately after the operation, she was seized with a severe fit of coughing, which continued half an hour, when she became more tranquil, and slept six hours during the following night. She continued in a favourable state until the 17th, the tumour diminishing, and the wound healing: when the wound again opened, the

tumour increased, and became painful; she had a violent cough, great difficulty in swallowing, and a high degree of constitutional irritation. She gradually got worse, and died on the 21st.

Inflammation of the aneurismal sac; having extended to the base of the brain. Owing to the pressure of the tumour, the pharynx would scarcely admit a goose-quill. The cause of her death then, was the inflammation of the aneurismal sac and parts adjacent, pressing on the pharynx and deglutition, and upon the larynx, so as to excite coughing, and to impede respiration. Dissection.

The second case was that of John Humphreys, who had an aneurismal tumour on the left side of the neck, about the size of a walnut, extending from the angle of the jaw to the thyroid cartilage. The operation was performed in Guy's Hospital, on the 22nd of June, 1808, in the same manner as in the preceding case, only that the artery was divided between the ligatures. The patient had scarcely one unfavourable symptom after the operation: the ligatures came away on the 15th of July. The wound closed slowly, and the man returned to his employment on the 14th of September. Case.

TYING THE SUBCLAVIAN ARTERY.

The middle of your incision should be opposite to the external jugular vein, and centre of the clavicle. Speaking anatomically, the view of the parts exposed in this operation may be thus described (Sir Astley exhibited them): here you see the omo-hyoideus muscle crossing obliquely above the clavicle, below the sterno-cleido-mastoideus upon the inner side, and the jugular vein passing immediately opposite to the centre of the opening. Mr. Key informs me that in the operation which he performed at the other hospital, for securing this vessel, that it was much facilitated by a free division of the clavicular portion of the sterno-cleido-mastoideus, and that after having done so, he was enabled, with a common aneurismal needle, to introduce the ligature under the vessel. Soon after commencing this operation, you meet with The operation described.

branches of nerves from the axillary plexus—you must carefully avoid including these in the ligature; for it would be a fatal error if you were to tie them. The scalenus anticus being the boundary of the artery on the inner side, you cut down for the purpose of finding its inner edge; this you will find a useful guide.

First done by Dr. Post.

I have lately heard a person say, but do not know upon what authority, that the operation for tying the subclavian artery has been successful, but upon one side only. The first person who succeeded in this operation, was Dr. Post, of Philadelphia, an exceedingly clever, industrious surgeon. Since this gentleman, several others have performed it, and the results favourable—a gentleman of the name of Liston, of Edinburgh, is one—Mr. Bullen, of Lynn, in Norfolk, another—and you have lately seen a very successful one in the other hospital.

Mr. Keate, sen., the uncle of the present Mr. Robert Keate, performed the operation below the clavicle, and the first time he did so it was completely successful; there may happen cases of axillary aneurism when the operation below the clavicle would be the best and safest, but unquestionably in ordinary instances that which I first described, *viz.* the one above the clavicle, is by far the most preferable. If, gentlemen, you were asked what artery chiefly supported the circulation after the subclavian had been tied, your answer would be the superior scapular. The late Mr. Taunton, lecturer on anatomy, had in his possession an excellent specimen of natural obliteration of the subclavian artery, and in this example the superior scapular had become very much enlarged.

TYING THE BRACHIAL ARTERY.

For a puncture in venesection.

This artery very seldom requires to be secured in consequence of aneurism; but it is often rendered necessary from other causes, such as wounds, and some of these wounds indeed, as in bleeding, give rise to aneurism. When an aneurismal tumour at the bend of the arm has been thus formed, let me recommend you not to cut

down upon it in order to secure the vessel; rather tie the brachial artery at the middle of the arm, and not make an incision upon the swelling at the middle of the elbow. To put a ligature upon the vessel here, amidst a mass of extravasated blood, is tedious, difficult, and dangerous.

Fatal case.

A young gentleman in the hospital bled a man, and in doing so penetrated the radial artery; thirty-seven ounces of blood were lost before he could succeed in stopping it; in three days the pressure caused so much pain that the man requested it to be lightened; this was done, and the bleeding returned; at the end of the week one of the surgeons deemed it prudent to secure the vessel, and he did so at the part where the wound had been made; the operation took an hour in performing, and it was excessively difficult to find the vessel. On the following day there were much irritation and inflammation, and on the tenth day from the accident he died.

Case of the Barber-surgeon.

When I was with Mr. Cline, about forty years ago, one of my fellow-apprentices came up to me in a great fright, and said, "Lord! Cooper, what do you think I have done?" "Something very bad, surely," replied I, "or you would not look so pale." "Why, I have just been bleeding a man, and in doing so have punctured his radial artery." "Well," I said, "is he in the hospital?" "Oh, no, I have taken care of that; I bound up his arm as tightly as I could, and sent him away." In two or three days this man came back, and showed his arm to the surgeon, who, very properly, upon seeing what was the matter, made light of it; told him that a trifling operation must be performed, and in a few days he would be quite well. The man, upon hearing that he was to be again cut, would not consent, and left the hospital. As he was walking up Holborn, he happened to see the shop of a barber-surgeon, and in he went; this learned gentleman, after having inspected the tumour, said that he would soon give him relief, by letting out the matter with his lancet; well, he thrust in the instrument, and the moment he did so, out gushed a quantity of arterial blood; this so frightened the barber, that he rushed out of his shop, and left the poor patient to manage for himself; fortunately some person

happened to be in the way, who bound up his arm, and brought him to the hospital; one of the surgeons put a ligature on the artery, and the man ultimately did well.

The operation.

In tying the brachial artery, there is only one circumstance of any importance to bear in mind, and it is this: the vessel is accompanied by the median nerve; now, if you should include this in the ligature, it would either destroy the patient's life or cause paralysis of the limb. When you are about to secure the brachial artery, the direction for the incision is the inner edge of the biceps muscle, and this cut almost immediately lays bare the median nerve.

Aneurismal varix.

When the brachial artery is punctured with the lancet through the vein in bleeding, an adhesion is sometimes produced between the one and the other; and the blood flowing from the artery into the vein, causes an enlargement of the latter, opposite the elbow joint. The swelling is called aneurismal varix, from the enlargement of the vein, and from its connexion with the artery. The swelling acquires the size of a pigeon's egg, and then it usually ceases to increase. There is a pulsation in the swelling, with a thrilling sensation, and a hissing noise. If the artery be compressed above, the swelling becomes flaccid, and can be emptied of its blood; but if the arm be compressed below the swelling, the pulsation continues, and the size of the swelling remains unaltered. The brachial artery, above the varix, becomes enlarged, owing to the greater quantity of blood which it conveys.

The swelling of the vein proceeds to the size that I have mentioned, and then becomes stationary. A woman, with this altered state of the circulation, used frequently to exhibit her arm to the students for many successive years, and it seemed to remain annually the same.

No operation has been required for this disease, in any case which I have seen of it, as it is not a dangerous state, either to the life, or even to the arm. It renders the arm weaker, and nothing more serious arises from it.

Case.

Mr. Atkinson, a most respectable surgeon at York, sent me an

account of a case, in which an operation had been performed for this disease, and it proved fatal.

When the accident has recently occurred, it may be cured by the following plan. Treatment.

A young lady was brought to my house by the surgeon who had the misfortune to prick the brachial artery in bleeding. The wound had healed, but an aneurismal varix followed, of the size of a pigeon's egg, attended with strong pulsation, a thrill, and a hissing noise. I ordered it to be compressed with a dossil of lint and a roller; but it did not succeed in subduing it. I then directed that a circle of iron should be put round the arm, with a pad, which could be screwed down on the brachial artery, in the middle of the arm, between the shoulder and elbow joint. This she bore without much suffering, and gradually the swelling at the elbow subsided, and pulsation in the brachial artery, and in the tumour could not be perceived. As the gentleman, who attended the case with me, was well acquainted with Mr. Abernethy, he took the young lady, at my request, to Mr. Abernethy, to show him the cure of this disease. Case.

TYING THE ULNAR ARTERY.

When this artery is required to be secured, what is the anatomical direction for the incision? Why the tendon of the flexor carpi ulnaris: if you make your cut upon the inner side of this tendon, you will directly perceive the ulnar artery and ulnar nerve. This then is the part where the vessel may be most easily and safely tied.

In aneurism of the ulnar artery, situated at the wrist, it is right to open the sac, to tie the artery above and below the opening, taking care to exclude the ulnar nerve, which closely accompanies the artery.

TYING THE RADIAL ARTERY.

In aneurisms of the radial artery at the wrist, which are frequently

occurring by wounds from glass, the aneurismal sac must be opened, and the artery tied above and below the opening.

For aneurism. What is the anatomical direction here?—the answer is, the tendon of the flexor carpi-radialis—cut upon the radial side of the tendon, and you will immediately find the artery close to its edge. Instead of putting ligatures upon these vessels at the wrist for aneurism, or wounds of the palmar arch, it has been recommended to employ pressure, by means of cork folded in lint, and bound down by a bandage. This practice, when used, leads to great inflammation and irritation—and I would advise you against using pressure generally, and more especially as regards the ulnar and radial arteries, as they can be so easily tied if you possess the least anatomical knowledge; and if you do not know anatomy you had better never touch the body at all.

TYING THE CAROTID ARTERY.

When this vessel is to be secured, it is desirable to make the incision as high as you can; the upper boundary, therefore, will will be the angle of the jaw, and below the omo-hyoideus: make your incision first, then high up, on the inner side of the sterno-cleido-mastoideus; upon drawing aside the edge of which you will distinctly see the omo-hyoideus obliquely crossing the artery. (Sir Astley here exhibited it in the dead body.) I have laid bare the carotid, and will now show you what you must principally take care to avoid in this operation, *viz.*, the par-vagum, which accompanies the artery; if you were to tie this nerve you would endanger life; well then, when you are about to pass the ligature round the vessel, if you raise it a little, you can readily discover whether the nerve be in contact with it, and thus guard against an accident which might lead to a fatal result.

Aneurisms of the scalp and their treatment. I will now conclude the lecture by saying a few words on aneurisms from arteries of the scalp. The first case of this kind that I saw was sent to me by Mr. Toulmin, of Hackney: in this instance I tied the artery proceeding to, and from, the tumour. If

the aneurismal bag be not very large, you may cut immediately across it; apply a piece of doubled lint, then adhesive plaster, and over the whole a roller. If the swelling is small, that is not larger than a walnut, adopt another mode, which is to make a circular incision completely down to the occipito-frontalis tendon. In this manner the connexion between the blood vessels and the aneurism is destroyed: and, by applying a dossil of lint and strips of adhesive plaster, you speedily succeed in getting rid of the disease. I saw a case of aneurism of the posterior aural artery, and for its cure, tied all the vessels which were leading to and from it. I should have done better, by making the circular incision, that I have just described, round the tumour.

LECTURE XXIII.

ON HYDROCELE.

HYDROCELE is an accumulation of water in the tunica vaginalis testis; the anatomy, therefore, of those persons who say that the fluid is contained between the tunica albuginea and the tunica vaginalis is exceedingly faulty. Such a description is entirely false; and I scarcely need tell *you*, gentlemen, that the water is completely enclosed in the cavity of the tunica vaginalis. If the question were put to you, where is the water situated in hydrocele? the answer would be what I have just stated; and if you gave any other, it would be directly perceived that your knowledge of the anatomy of the part was but imperfect. Definition.

The situation of the water in hydrocele is precisely similar to water in the pericardium; and what should we say of the man who would assert that this water was contained between the pericardium and heart? Why, gentlemen, we should feel assured that he was entirely ignorant of the matter, for water in the pericardium is Hydrops perecardii.

situated distinctly within it: and so is water in hydrocele completely within the tunica vaginalis.

Hydrocele of two kinds.

Hydrocele is a generic term, and a multitude of tumours have received this appellation. It is now, however, usually confined to two; I should, therefore, say that hydrocele is of two kinds, *viz.*, 1st, of the tunica vaginalis; and, 2d, of the spermatic cord.

HYDROCELE OF THE TUNICA VAGINALIS.

Described.

Well, then, of hydrocele in the tunica vaginalis. The swelling at first shows itself at the lower part of the testicle, and gradually rises till it arrives at the abdominal ring; is of a pyriform shape; largest two-thirds of the way downwards; a little less at the bottom; and smallest at the ring.

Symptoms.

The common formation of hydrocele is unattended with pain, excepting, however, in those cases where it has been the result of inflammation; but, generally speaking, there is no pain, and the patient accidentally discovers the existence of the swelling, and often not until it has arrived at considerable magnitude. Commonly there is no redness of the scrotum—no discoloration.

Situation of the testicle.

The ordinary situation of the testicle in hydrocele is two-thirds of the way down the tumour, at the posterior part. Here, I say, is its usual situation; but in this respect it sometimes varies, as I shall presently show you. In performing the operation for hydrocele, it is of the utmost importance that you should have an exact knowledge of the situation of the testicle, for ignorance in this respect has often led to its being pierced by the trocar. You can easily discover the position of the testicle by a careful examination of the swelling, and by squeezing it with some degree of force at every part. When you press upon the testicle, you will find that part of the tumour more firm; the patient will manifest much uneasiness, and complain that you give him a good deal of pain: in this manner, then, you can readily discover where it is situated.

The weight of the tumour is but little (this of course means

PLATE I. A.—MORBID ANATOMY.

Fig. 1. This is a preparation in the collection at St. Thomas's Hospital before my time, therefore I know nothing of its history. It is excessively hard—in some parts cartilaginous, in others ossific.

a a, with large spots of cartilage, and some bone.

b, epididymis enlarged and hardened.

c, spermatic cord enlarged.

Fig. 2. This represents the testis of Dr. Monsey, given to the collection at St. Thomas's Hospital, by Mr. Thompson Forster. The body indicated by the letter *e* is supposed to be a third imperfect testis; the doctor had the appearance of having three testes; but this was probably a chronic tumour of the cord.

a, spermatic cord.

b, epididymis.

c, body of the testis.

d, vas deferens.

e, supposed third testis.

f, epididymis.

g, testis.

Fig. 3. The common hydrocele of the tunica vaginalis.

a, spermatic cord.

b, tunica vaginalis reflexa.

c c, testis covered by the vaginalis testis.

d d, cavity in which the serum is contained.

comparatively); when you lift it, you will be astonished at its lightness, which will at once convince you that it is not a solid substance. The next thing you notice is, if the part be not very much distended, that the swelling will be moveable, *i. e.*, if you firmly grasp it at its base, the fluid will ascend, and the tumour increase at its upper part; therefore, its lightness, mobility, form, freeness from pain, and the history of the case, constitute its distinguishing characters from other diseases. But there are two other remarks by which the disease may be known, one of them decisive and the other nearly so: these are, first, its sense of fluctuation; and, second, its transparency. I have just told you, that if you press upon the lower part of the swelling, it would decrease there and increase at the upper part, fluctuation at this time becomes evident to those who are accustomed to such examinations. Its transparency, or rather its semi-transparency, may be discovered in the manner I shall presently explain to you. This characteristic feature has been denied; I have certainly seen the tunica vaginalis so much thickened in very old cases of hydrocele, and in persons who had long resided in hot climates, that the examination required nicety and caution; but still a little art, as I shall presently explain to you, will enable the surgeon to form a correct diagnosis. Diagnosis.

Well, then, such are the common marks by which you distinguish hydrocele; but there are other varieties, and these I will mention to you; first, the water of hydrocele sometimes forms *two* swellings. I have before told you that the shape of the tumour is usually pyriform, and that the water gradually rises till it arrives at the abdominal ring; now, in this variety of two swellings, a portion of the water collects above the ring, giving rise to a tumour there; thus a swelling is formed above and below, the narrowest part being at the ring. Varieties of Hydrocele.

A surgeon unacquainted with this circumstance, upon looking at such a case would say, "Oh! this is not hydrocele, but hernia," and he would be strengthened in that opinion by seeing the upper part dilate upon coughing, in consequence of the impulse that it May be confounded with hernia.

would receive from the contraction of the abdominal muscles. Its transparency and lightness, however, would readily enable him to distinguish this complaint from hernia. Why, this very day, a gentleman came to me under the following circumstances: when he came into my room, he informed me that he had been twice tapped, and that he did not think the operations had been well performed: I looked at the swelling, and found that it extended to the abdominal ring; I examined the part very carefully, and requested him to cough; the moment he did so, the swelling was evidently forced down; well, said I, this may be hydrocele, but I shall not tap you; I requested a candle to be brought; no transparency was observable; I desired him to lie down upon the chairs, when I found it to be hernia, and reduced it. This, then, shows how cautious we ought to be in such cases, before we introduce the trocar, for I might have been misled by the history of this case, and have proceeded at once to perform the operation of tapping: had I done so, in all probability, the trocar would have passed into this gentleman's intestines. It was a hernia which had succeeded hydrocele.

Case.

Double cavities.

Another variety met with, is that in which a fluctuating swelling will remain, after a considerable portion of water has been removed. The first case of this kind that I saw was sent to me by Dr. Chest, and Mr. Roberts, of Gloucester. The patient had been under the care of those gentlemen, and had been tapped for hydrocele: a quantity of water was drawn off, but still a swelling remained. He was sent to town for me to see him, at which time the hydrocele had become nearly as large as before. Upon hearing the history of this case, the impression upon my mind was, that when the operation for tapping had been performed, the operator had let the canula slip out of the tunica vaginalis, which circumstance, I thought, had led to the retention of a portion of the fluid. Well, believing this, I passed in the trocar and canula myself; some water came away, but not all; this struck me as being very strange, for I had taken great care to keep the end of the canula within the tunica vaginalis. I examined the remaining swelling; found fluctuation; then tried it with a candle, and saw that it was transparent. Well, sir, I said,

Case.

this is water now, introduced the trocar again a little way from where I did at first, and off it ran. The fluid, in the second instance, had nothing of the yellow appearance of that which is drawn off in hydrocele, but on the contrary, was as clear as water.

Necessity of knowing the relative position of the testicle.

I have before mentioned to you, that the testicle in hydrocele is commonly situated at the back part, and two-thirds of the way downwards. Here, however, there is great variety, and it is even sometimes found in front. I will tell you how this happens. The person is attacked with inflammation in the tunica vaginalis, before any collection of water has taken place; adhesive matter is thrown out, probably at the fore part, which occasions permanent adhesion between the middle and outer coat of the testicle: should serum be secreted after this, of course it would be lodged at the sides and posterior part. What would the consequence be, if, in such a case as this, the trocar were to be introduced in the usual situation? Why, that it would pass into the testicle.

Case.

A gentleman of great importance in this town, consulted his regimental surgeon for a swelling in the scrotum; it was pronounced hydrocele. The operation of tapping was resolved upon; but when the trocar was introduced, it passed only into a solid substance, and no water came away. The surgeon stared, and said, "Sir, I am a little mistaken in this case; you have a diseased testicle here, instead of hydrocele, as I at first supposed, and it is necessary that the diseased part should be removed." But the gentleman, being a young man, did not think it would add much to his enjoyment to lose a testicle—*(loud laughter)*—and thought that it required some hesitation before he resolved upon such a measure; consequently he did hesitate, and the result was, that he consulted another surgeon. Upon examination, the testicle was found at the fore part of the swelling, and the fluid at the sides and bottom. Whilst taking off his clothes, some copper-coloured eruptions having been seen, he was asked if there was any enlargement of the bones; when the right tibia was found considerably swollen. He was put under a course of mercury, for these secondary symptoms, which soon got well. The hydrocele still remained, and as the surgeon who first

saw this case was right in his first opinion as to its nature, he was sent for to repeat the operation of tapping. He now introduced the trocar at the side of the swelling, instead of the fore part; the water was withdrawn, and the patient perfectly recovered. This case shows the necessity of extreme caution in determining the situation of the testicle before the introduction of the trocar.

Hydrocele above the testicle.

The testicle is sometimes found at the bottom of the swelling. Now (holding up a preparation), here is a curious thing. This hydrocele, you observe, was situated between the testicle and abdominal ring, the testicle being quite at the inferior extremity of the tumour. Adhesive inflammation, in this instance, had completely united the middle to the outer coat; consequently, the descent of the water had been prevented.

Result of inflammation.

Here is another preparation, in which the water had collected at the sides, adhesion having taken place before and behind.

Another variety.

Here is another preparation, in which it appears as though the hydrocelic sac had arisen from the tunica vaginalis, in the same manner as an aneurismal sac is occasionally formed from the coats of an artery.

Encysted hydrocele.

In hydrocele, it sometimes happens that the fluid is formed in a distinct bag or cyst, between the tunica vaginalis and tunica albuginea; this complaint is usually combined with common hydrocele.

State of the tunica vaginalis.

There are great varieties with regard to the state of the tunica vaginalis; and it is found much thicker in those persons who have for a long time resided in hot climates, such as the coast of Africa, or West Indies, than in such a climate as our own. When, therefore, you find a tumour about the testicle, apparently solid, but of little weight, you are to be very cautious in your diagnosis; you are somewhat called upon to explore the swelling with a lancet; that is, puncture it lightly where there is the most appearance of fluctuation; and often when least expected, the testicle will be found in a healthy state.

After the water has been discharged, it frequently happens that

the tunica vaginalis, in consequence of its extreme thickness, will remain in large folds.

The tunica vaginalis has, in a few instances, been found ossified. Mr. Warner, formerly surgeon at Guy's, met with an example of this. There is a similar preparation in the museum at the other hospital, which any of you might see by applying to Mr. Stocker. Mr. Beaver, formerly a student here, accidentally discovered a case of it in our dissecting-room.

Then, with regard to the contents of hydrocele, it is usually yellow serum. But sometimes small cartilaginous bodies are found in the fluid; when these are seen, they prove that the hydrocele had existed for a very long time, and are always proof of its age. Appearance of the fluid.

There is another variety which I ought to mention here; it has been called the *congenital hydrocele*, in consequence of a communication having from birth existed between the tunica vaginalis and cavity of the abdomen. When the parts are natural and perfect, there is no opening leading from one to the other, as you know; but occasionally the natural closure does not take place, and then a fluid may descend from the abdomen, and collect in the tunica vaginalis. In this manner, sometimes from ascites, the scrotum will become greatly distended; and here, in such cases, is the best situation for tapping. The hydrocele of which I am now speaking may be readily discovered from any other, in consequence of your being enabled, with ease, to return the water into the cavity of the abdomen: this you can effect by placing the person upon his back, and then elevating the scrotum. Congenital hydrocele communicating with the abdomen.

The first case of this variety of hydrocele that I saw was sent to me by Mr. Dobson, of Harrow. The patient being a very young person, I was apprehensive of peritoneal inflammation, if I injected; it occurred to me that I might succeed in shutting up the communication with the abdomen by means of a common truss, when I might afterwards safely tap and inject for the radical cure. A truss was accordingly applied over the ring, and ordered to be worn for two years; at the end of one year Mr. Dobson wrote to me to say that the lad was quite cured. Now this I did not expect. Case.

What had happened was this: the pressure of the truss had succeeded in destroying the communication between the tunica vaginalis and abdomen, and then the water had become absorbed. I advise you, should you ever meet with such a case, to pursue a similar practice; for, as you see in this case, the opening which exists may be closed, and if the person's health be good, the water may be absorbed, thereby rendering an operation unnecessary. The result of that case gratified me exceedingly.

Diagnostic characters.

Diagnosis.—Now, then, as to the *best* mode of distinguishing hydrocele. When a patient comes to you with a fluctuating swelling in the scrotum, in which the testicle is enclosed, you order a candle to be brought; then, squeezing the tumour at the posterior part, you distend the front so as to make it tense; apply the skin of the little finger, and that covering its metacarpal bone at the outer side, to the surface of the tumour, and then cause the candle to be held as close as possible opposite to where the two skins meet. In this way you will never fail to discover the transparency of hydroceles which are formed in this climate; and it is only the clumsy, awkward mode in which the experiment is made, that occasions any person to be unsuccessful in it, which, if conducted differently, would lead to a satisfactory result. I have seen individuals, however, from Sierra Leone and the West Indies, in whom the tunica vaginalis had become so much thickened as to render the hydrocele perfectly opaque.

Differs from Hernia.

From Hernia it may be distinguished by the occasional return of the hernial swelling into the abdomen; by the dilatation of hernia in coughing; by hernia descending from the abdomen, and by hydrocele augmenting from below upwards. Hydrocele and hernia are, however, sometimes combined in the same individual, when the hydrocele is placed before the hernia. Hydrocele is sometimes met with below an adhering omental hernia. Fluctuation and transparency are also diagnostic marks of hydrocele.

From varicocele.

Hydrocele may be distinguished from varicocele by placing the patient in the recumbent position, in which varicocele disappears.

Diseased testicle may be easily distinguished from hydrocele by

its weight and flatness, and the pain and sickness which it occasions; and often by the discolouration of the skin covering it, and by the semi-transparency and lightness of one tumour and the heaviness of the other. Differs from diseased testicle.

There is one disease somewhat difficult to distinguish from hydrocele, *viz.* hæmatocele: this is a collection of blood in the tunica vaginalis testis, and produces in form an exactly similar tumour to hydrocele; but the history of the case is quite different, and your best guide. If you ask how it happened, the answer is—"Why I was riding, when the horse became restive, began to plunge, and threw me forward on the pommel of the saddle; I soon afterwards discovered this swelling." Then, if you inquire whether there were any marks or bruises in the skin of the scrotum, the answer will be, "Oh, yes; it was black and blue." Whenever you find a swelling thus suddenly formed after a blow, having the figure of hydrocele, you may be certain of its being blood. Hæmatocele.

But, gentlemen, guard against mistaking this complaint for diseased testicle. I was once present in the other hospital when a healthy testicle was removed, owing to this error; and some years since, one of the first surgeons in this town, after having removed a tumour from the scrotum, and when the gentlemen were leaving the theatre, desired them to wait a moment, and he would show them the disease of the testicle. However, upon cutting the part open, the great bulk proved to be blood, and the testicle was in a perfectly sound state. Such an unfortunate occurrence as this a man must for ever lament. Sometimes mistaken for diseased testicle.

The cause of hydrocele appears to depend upon increased secretion, as the vessels are dilated, though there is generally no inflammatory action. Its cause.

Inflammation of the testicles will give rise to hydrocele; for as the inflammation disappears, hydrocele forms. This can generally be removed by exciting absorption: for which purpose give the pil. hydrarg. submur. comp., and apply to the scrotum a lotion composed of liq. ammon. acet., having dissolved it in some of the ammon. mur. These means will be found to have considerable From inflammation

influence in this hydrocele, which results from inflammation; but in the other they have none.

Spontaneous cure.

Hydrocele, if left to itself, will often undergo spontaneous cure. A man was brought into the other hospital with a sloughing of the scrotum, a consequence of an inflammation occasioned by a hydrocele; the water was, in this case, discharged by a natural process, and nature performed a radical cure by effecting a permanent adhesion of the parts.

Case.

Hæmatocele is sometimes founded on hydrocele. Dr. Saunders, formerly teacher of medicine at Guy's, had a hydrocele, for which he applied to Mr. Lucas, my colleague at Guy's, to have it tapped. In stepping upon a chair to reach a book, he fell against the back of the chair, and received a blow upon the scrotum, which reproduced, as he thought, his hydrocele, and in a few days he went to Mr. Lucas to have it tapped, but, upon the introduction of the trocar no water passed; the doctor then consulted several surgeons, and at length Mr. Cline made an incision into the part, and the tunica vaginalis was found full of coagulated blood, which was discharged, a poultice applied, and he soon recovered.

Not always produced by a blow. Case.

Hæmatocele is not always produced by a blow. I attended, with Mr. Hicks in Bond-street, a gentleman who had a large pyriform swelling in the left tunica vaginalis, which had never been painful, and which had an obscure fluctuation. I made an incision into the swelling, in the presence of Mr. Hicks, and discharged near a pint of fluid blood. This swelling did not succeed a blow, but to excessive exertions which this gentleman had been in the habit of making.

Palliative treatment of hydrocele.

I shall conclude this lecture by describing to you the *palliative* treatment of hydrocele, reserving what I have to say on the *radical* or *curative* treatment until we next meet.

When persons are afraid of the curative treatment, or when it would be attended with inconvenience, as also in old people, the palliative will be demanded. It is a very simple operation, and one which any person can perform. Remember that the testicle is two-thirds of the way downwards at the posterior part; introduce,

therefore, the trocar in the fore-part obliquely upwards, indeed almost perpendicularly, to avoid wounding the testicle; but as I have before shown you that the testicle occupies different situations in the tumour, you cannot introduce the trocar with safety until you have ascertained the precise spot where the testicle is lodged, and then you will of course take care to avoid it. Let me observe, that whether you perform the operation for the palliative or curative treatment, withdraw the trocar the instant you believe that the canula is within the tunica vaginalis; and once having the trocar in, take care to keep it there until the operation be concluded; and the most effectual way to do this is by grasping the tumour at the posterior part, so as to keep it tense where the trocar entered. I generally use a trocar and canula of small size. Some persons recommend a lancet and probe to be employed; it is mere nonsense: if they had ever performed the operation, they would not do so. Such suggestions can only emanate from people who are destitute of experience and knowledge.

If you wish to accomplish this operation bloodlessly, to prevent internal bleeding, and the formation of hæmatocele, keep the patient, at the time you are doing it, in the erect position. There is no necessity for any after application; on the following day the wound will be well.

It requires repetition in proportion to the dropsical tendency existing in the person. In some it will be necessary once a month; in others, once in three months; but, generally speaking, the usual time is every six months.

Not always devoid of danger.

Insignificant as this operation appears, it has been known to cause the destruction of life. Two instances are within my own knowledge. One of the cases was operated upon by Mr. Green, who resides a few miles from town, and the other by myself. Mr. Green's case was published in the journals, therefore I need not scruple to mention it; but Mr. Green possesses too much manliness to regard a notice of an unsuccessful case, and it must be a mean despicable mind that would. The case is as follows:—An elderly man applied to Mr. Green with a hydrocele, which he a few days

Case.

afterwards tapped. The following day the man's business led him to walk to town; on the next day his scrotum became inflamed; the third there was a gangrenous spot; and, on the fifth day from the operation, he died.

Case. The other case was the father of one of our dressers. I performed the operation on a Saturday; the following day he walked to Paneras church; on the Monday inflammation began to show itself in the scrotum, when he sent for me; on the Thursday gangrene had taken place, and on the Saturday week after the operation he died.

Let me advise you then, whenever you perform this operation on old persons, to make them keep their beds for a few days afterwards. Some individuals are destroyed by the slightest touch; while others, on the contrary, are not killed, do what we will to them.

LECTURE XXIV.

ON THE OPERATIONS FOR THE CURE OF HYDROCELE.

Not cured by rupture. HYDROCELE is not cured by the accidental bursting of the sac; when this takes place, it is followed by a temporary cessation of the hydrocele, which either returns again, or is succeeded by hæmatocele.

Case. A gentleman who had been subject to hydrocele for many years went to the continent, and whilst riding out on horseback, struck himself against the pommel of the saddle; for several hours afterwards the swelling was considerable; diffused instead of circumscribed; absorption, however, soon took place; the swelling gradually lessened, and the gentleman thought that his hydrocele was cured; in fact, he congratulated himself on it. Not long after this the swelling returned, and when he came to England, he called on me, and I performed the operation for hydrocele, which presented nothing peculiar.

Another case of the bursting of a hydrocele occurred in the person of Dr. Saunders, of the other hospital, a person well known in the profession. Whilst standing on a chair to reach a book, he slipped his foot, by which means he received a blow on the scrotum, which was enlarged from a collection of water in it. Mr. Lucas, late surgeon of Guy's, who had been in the habit of tapping him for this complaint, was sent for immediately after the accident, to perform the operation again; the swelling was very large, and Mr. Lucas, not at all suspecting that the character of the complaint was changed, put a trocar into the scrotum, but no water came, which alarmed the doctor considerably. A consultation was held, at which many of the most eminent professional men of this town were present; the scrotum was swollen and harder than natural, blood was extravasated into the tunica vaginalis; it was determined to attempt to relieve the swelling and ecchymosis by stimulant lotions, but these failing, an incision was then made into the scrotum, when there was found some coagulated blood, which had been substituted for the water. Thus then a blow on a scrotum affected with hydrocele will change that disease into hæmatocele, which can be afterwards cured by an incision. Case of Dr. Saunders.

The cure of hydrocele is effected in three ways: 1st, by absorption; 2dly, adhesion; 3dly, granulation. Now I observed to you in the last lecture that when hydrocele is produced in the common way, medicine or local applications have hardly any influence on it; when it arises from a relaxed state of the vessels, stimulating medicines and blisters have no effect on the complaint. But I also stated on a former evening that hydrocele is produced by an inflammatory state of the parts, and that in these cases absorption by stimulating lotions should be promoted. Three modes of treatment.

I will now further add, that in young persons and children, who are not unfrequently subject to this affection, cure by absorption alone is effected, that is, by giving the hydrargyri submurias, scammony, rhubarb, and other medicines, so as to dispose the constitution to absorb. The liquor ammoniæ acetatis and ammoniæ murias are the local applications generally made use of to promote Cured by absorption.

absorption in the parts, and what we do to facilitate the operation of these remedies, is, to have a bag or suspensory truss to hold the scrotum, and this is fastened by two tapes round the abdomen, just below the umbilicus, and kept constantly wet with those fluids, in order to stimulate the absorbents; therefore be on your guard about performing an operation for hydrocele in young persons, as the cure can be effected by absorption alone; there are a few exceptions, however, to this rule, but they are exceedingly rare, as in almost every case of hydrocele in young persons or children, the water will be absorbed.

The operations

With respect to the adhesion of the tunica vaginalis in the cure of hydrocele, this is effected in three ways, by injection, seton, or incision; but the use of injection does not always produce adhesion of the tunica vaginalis; here is a specimen (pointing to one on the table) which was taken from a captain of a ship one morning, on whom I performed the operation for hydrocele by injection, by which he was relieved of every symptom of the complaint; several years after this he was taken extremely ill, and I was consulted by his attendant surgeon; he was dying of some organic affection; I desired the surgeon to remove the testicle and tunica vaginalis from the side on which the operation had been performed, as soon as the patient was dead, which was done; on examination it was found that the tunica vaginalis did not adhere completely, there were a few adhesions in some parts but not generally; the injection did not produce adhesion, but a new series of actions was set up, a deposit was secreted, and the ends of the arteries were sealed, so that any further secretion was prevented.

The operation by incision.

The process of granulation is set up when an incision is made in the scrotum, and extraneous bodies introduced, but this requires considerable caution; some surgeons use one mode of cure, some another; various are the operations which have been proposed, but most have now yielded to that of injection. In the operation by incision you divide the scrotum and tunica vaginalis, on the front part, so as to allow the water to escape, but it was soon found that this was not sufficient to effect a cure, and it was then recommended,

that after the incision had been made, a portion of the tunica vaginalis should be cut out: but this operation is followed by high constitutional irritation; it is true that it sometimes effects a cure by preventing the return of the hydrocele, but it also does it by killing the patient; in fact, the very last time that I saw this operation performed, a violent inflammation and sloughing of the scrotum ensued; why, gentlemen, any one rather than undergo such an operation, would submit to have a hydrocele all his life; the mode of relief is too cruel for so trifling an inconvenience.

By tent or seton.

The next mode is that of introducing a tent into the tunica vaginalis; a small incision is made through the tunica vaginalis and scrotum, and a piece of lint or sponge is introduced, so as to prevent the sudden escape of the water; the water gradually issues out, during which time adhesion and granulation often takes place; but this sometimes fails. Caustic and setons were formerly very much used, two remedies, about which there was as much bandying and quarrelling among the members of the profession as if the world were at stake on the issue—two remedies, which now are not only generally abandoned, but which I should be ashamed to own ever having used; such is the folly of quarrelling in our profession; as for arguments on subjects which are only to be settled by observation, they are of no use; and persons who argue thus *à priori*, without a knowledge of facts, which alone ought to form the basis of argument in our profession, want that judgment which conducts a a man best through life; but many were the advocates of caustic as a cure for hydrocele; and the way it was used was by taking the potassa fusa, and applying it to the fore part of the scrotum, till an eschar, of the size of a sixpence, is formed, which produces an irritation to the extent of half an inch, or three quarters of an inch around, and then the eschar so produced destroys the skin and tunica vaginalis; as soon as the inflammation arises, the water escapes, then the parts sometimes become glued together, and granulations arise. Well, gentlemen, this remedy soon fell into disrepute; 1st, on account of its uncertainty; 2dly, because it was dangerous to life; here is a specimen (pointing to one on the table),

taken from a person who died from the application of caustic, and this gives me an opportunity of showing you the state of the parts after the use of this application. The operation with caustic is dangerous to life, and ought not to be performed.

OPERATIONS AT PRESENT USED FOR THE CURE OF HYDROCELE.

Recapitulation

There are but three operations I know of, which are occasionally had recourse to in the cure of hydorocele: 1st, setons; 2dly, incision; 3dly, injection.

Setons may be used for children.

Setons are very rarely used, but I tell you, that they may now and then be, advantageously. The seton should be made in the following way: you should take a curved needle, and carry it into the tunica vaginalis and scrotum, just at the point where the trocar had been previously introduced, and include two inches above the point where the needle enters, and bring it out sufficiently long; the result is, inflammation generally ensues, water gradually escapes, and as this takes place, adhesion of the tunica vaginalis comes on: this operation for adults has been generally abandoned, because better means have been employed; it is in those young persons whose hydroceles do not give way to the absorbent plan above-mentioned: then, if children about two or three years old have hydroceles, rather than inject, use the needle and thread: the thread should be allowed to remain for ten or fourteen days till inflammation and the adhesive process be set up; this plan is much better for children than that of injection, because there is no difficulty in doing the former, and there is considerable in the latter: for the operation of putting a ligature through the scrotum and tunica vaginalis is effected before the child knows any thing about it; in fact, after it is done, the child may run about, the knot being allowed to remain; the water escapes by the side of the seton; for children, then, I believe this to be the best mode.

Operation by incision.

The second plan is by incision. There is a difference in performing this operation now to what was done by Mr. Hunter, who had recourse to it in preference to that by caustic or seton;

Mr. Hunter used to put a little poultice into the part, after the opening had been made into the tunica vaginalis; a surgeon, who was present when Mr. Hunter was performing the operation, had mistaken the plan which he adopted, for having heard of the introduction of a poultice into the wound, he had brought materials for making one, flour, &c., and he began to mix it up in the man's scrotum; Mr. Hunter, always ready to catch an idea, sprinkled after this some meal or flour into the wound, so as to prevent instantaneous adhesion, and promote granulations. This operation gives you the means to prevent the return of hydrocele in many cases, yet it is an operation not perfectly unexceptionable; there are cogent reasons against performing it, but if there be any suspicion of a disease of the testicle, it may be done. In old persons it is not justifiable, and I would advise you against doing it in them. Here is a specimen (exhibiting one) where death ensued after the operation I have just described; a surgeon to one of these hospitals, who has been long since dead, introduced a bit of lint, dipped in oil, into an incision which he had made into the scrotum; the result was great constitutional irritation, and death; therefore there is danger of this operation in old persons, from the irritation which is likely to arise.

The modern operation described.

I shall now proceed to describe to you the operation which has superseded all others, namely, the cure of hydrocele by injection. At the time I was attending Mr. Hunter's lectures, the town was divided in opinion as to the best mode of performing the operation for hydrocele. So great was the difference of opinion among the students of the different hospitals, that it was quite ridiculous to observe their warmth on this subject, when there arose a plain, simple, effectual operation, which every body has since adopted. For this we are indebted to Sir James Earle, who, in thinking upon this subject, conceived that injection of the tunica vaginalis was likely to be the best means of producing adhesion, and preventing the further formation of disease. Thus he proposed at once a most ingenious but simple mode of curing a disease, about which there had been so many disputes. I cannot help feeling delight when I

find a brother in the profession rendering himself useful to mankind by an invention of this sort. When we see so much trash issuing from the press, which is called surgery, it is gratifying to find, in a work like Sir James Earle's, a simple and effectual plan of curing a disease proposed and at once adopted by the whole profession. I do not think Sir J. Earle has received the due meed of merit to which he is entitled for this improvement. I have, myself, always spoken of him in the same terms as this evening, and I shall ever continue to do so. The instruments required for this operation are an elastic bottle, with a stop-cock, a trocar, and canula. The elastic bottle should be of moderate size, and only half the quantity of fluid contained in it should be thrown in at a time, lest the action of the cremaster should force a part of it into the cellular tissue. If this happens, inflammation and sloughing may take place around the part at which the canula is introduced. The trocar should be two inches long, and the canula should be but small. The trocar and canula should be put separately into the box, for if you are obliged to put the trocar in the canula, it will soon contract, rust, and be unfit for use. The fluid used for the injection should be of a stimulating kind. If you use port wine, the proportion of wine and water should be half and half. If it be old port wine, you may mix five parts of wine with three of water; but if the wine be such as is commonly got at taverns and public-houses, in which there is a good deal of log-wood or sloe-juice to make it astringent, and a good deal of brandy to make it strong, a less proportion of wine must be used, as the injection would otherwise be too stimulating to the tunica vaginalis. Brandy, or spirits of wine, may also be employed; in the latter case, take one part of spirits of wine to fifteen parts of water.

Injection of zinc.

The injection which we generally use in the hospitals is the sulphate of zinc, in the proportion of one drachm to a pint of water. A gentleman, on being told that we employed the sulphate of zinc in hospitals, for injection in hydrocele, exclaimed, "Oh, I suppose you do this to save your wine." It is not to save our wine, however, gentlemen, that we prefer this solution, but because we are

better enabled to judge precisely of the strength of the stimulus by the use of the sulphate of zinc than by that of wine, which is subject to so much adulteration. Water itself will produce a stimulating effect, if used cold. A gentleman, whose name does not immediately occur to me, has written a treatise, in which he produces several cases of the successful treatment of hydrocele, by an injection of cold water. You must not suppose, however, that one fluid will answer the purpose as well as another; for I remember a case in which an injection of milk, which was used by the surgeon on the supposition of its being a bland fluid, produced most horrible inflammation. The tunica vaginalis suppurated, and when an incision was made to discharge the matter, the milk came out in curds, and a great quantity of pus had been produced.

Mode of operating.

Be upon your guard, therefore, against making experiments of this kind. When you inject for hydrocele, you should place the patient in the recumbent posture, which will enable you to perform the operation more steadily. Before you introduce the trocar and canula, make it a rule to squeeze the scrotum and tunica vaginalis, so as to make the part where the fluid is most distinct, very tense; then introduce the trocar and canula obliquely, in the same manner as in the palliative mode of treatment. Having passed the trocar and canula into the tunica vaginalis, withdraw the trocar, and push the canula alone carefully upwards, so as to prevent an injury to the testicles or spermatic cord. You should nip the tunica vaginalis round the canula, to guard against the instrument being diverted, and thus throwing a portion of the fluid into the cellular tissue. Having taken this precaution, you are gradually to throw up the injection, turn the stop-cock, so as to confine it in the tunica vaginalis, and move the scrotum from side to side, so that the fluid may reach every part of the surface. The fluid should be suffered to remain from about four to five minutes. While it remains in the tunica vaginalis, the patient will complain of a good deal of pain; he will first feel as if the testicle were squeezed; he will then feel the pain running along the course of the spermatic cord at the spinal process of the ilium, and at the loins where the spermatic plexus

of nerves arises, and lastly, at the neck of the bladder, in the course of the vas deferens. The pain will be greater or less in proportion as the patient is more or less irritable. It is to be observed, however, that the degree of subsequent inflammation is generally in the inverse ratio of the pain suffered at the time of the injection. If a man lies tranquilly on the table, and tells you that he does not feel much pain, he will in general have a considerable degree of inflammation the next day. On the other hand, when much pain is felt, it is generally the effect of nervous irritability, and little inflammation follows it.

After treatment.

I have been under the necessity of bleeding and giving large quantities of opium to a patient, in consequence of the severity of the pain produced by injection, and yet no inflammation was produced. You may say that this was in consequence of the bleeding; but this is not the case; the pain arises from irritation in the nervous, rather than the vascular system, and inflammation does not readily follow it. When you have suffered the fluid to remain five minutes, and withdrawn the instrument, you need not apply any thing to the part, but tell the patient to walk about as usual in the course of the day if he feels but little pain. If he should feel much pain, tell him to lie down, take his dinner that day, and his glass of wine after it, if he has been in the habit of doing so. After a few hours have elapsed, inflammation will probably come on.

If inflammation do not come on.

Above all, tell your patients to come the next day, that you may see whether the inflammation, which is necessary for the cure of hydrocele has been produced; if it has not, you must not despair of producing it. Take the part in your hand, and touch it here and there until the patient feels a good deal of uneasiness. Then desire him to take a long walk, and to take an additional quantity of wine after dinner. In this way you will generally succeed in producing such a degree of inflammation as will be sufficient to effect a cure.

Should inflammation come on.

It sometimes happens, however, in constitutions which have a great disposition to inflammation, that the injection will act so violently as to produce suppuration. When there is danger of this,

which you may ascertain by the great pain and redness of the scrotum, make an incision with the lancet into the part, and discharge the contents, and if the opening be not large, the cure will be effected by the adhesive process. Do not suppose that the operation for hydrocele by injection, simple as it is, altogether devoid of danger. There have been some instances in which death has followed, and many in which life has been endangered by it. Some gentlemen who now hear me, have had opportunities of witnessing the practice of the hospitals for many years, and they must have seen many cases, in which extensive sloughing has been produced in consequence of injury caused by throwing the injection into the cellular tissue.

Fatal case of injecting the cellular tissue.

I will tell you a case which happened shortly after I became surgeon at the other hospital. I injected the tunica vaginalis of a patient for hydrocele, but did not succeed in curing him, for he came back two years after with his hydrocele as large as ever. He was naturally enough disappointed with me for my want of success, and he chose to put himself under the care of Mr. Forster. Happening to cast my eye on the man, as I passed through the wards, I asked him what was the matter with him, and he said, "Why, sir, I have got hydrocele; the disease which you attempted to cure has returned." Some time after I did not observe the man in the ward, and upon asking what had become of him, I was told that he had gone out of the hospital; but as I was walking home over the bridge, the man who told me so, accosted me and said, "Sir, I beg your pardon for telling you a story; but the truth is, that man about whom you asked, has, indeed, gone out of the hospital; but I omitted to say, that he is dead." The truth is, that one of the dressers, who was a very steady young man, performed the operation of injection, and that an accident happened to him, which, unless great care be taken, might have happened to any body. He did not attend sufficiently to keeping the canula within the tunica vaginalis; the consequence was, that a portion of the fluid went into the cellular tissue. The man experienced excruciating pain, and the dresser immediately withdrew the canula,

but very little of the fluid came out. Violent inflammation of the scrotum ensued, which went on to gangrene, and the patient died. Dr. Farmer recently met with a similar case, in which sloughing was brought on from the fluid being injected into the cellular tissue, and the result was the destruction of life. Great care, therefore, should be taken to prevent the fluid from escaping by the side of the canula.

Hydrocele of the spermatic cord.

I shall conclude this lecture with a few observations on hydrocele of the spermatic cord. This disease may be defined as a collection of water in the spermatic cord, but it is necessary that you should know the situation in which the water is collected. The part at which hydrocele of the spermatic cord takes place is in the tunica vaginalis, between the testicle and the abdominal ring, sometimes extending above the ring, and on that account it is often mistaken for inguinal hernia. By pressing your finger along the parts until you have passed the abdominal ring, you may judge of the nature of the tumour by its blue and semi-transparent appearance, by its being entirely unattended with pain, and by its not running into the abdomen like inguinal hernia.

Mistaken for hernia.

Treatment.

The best mode of treating this disease is to make an incision in the tumour, for injection would, in this situation, be difficult and dangerous; to introduce your finger into the sac, so as to ascertain that there is no communication with the abdomen, and then introduce a small quantity of flour to promote a slight internal irritation. In this manner, the cure of hydrocele of the spermatic cord may be readily effected.

LECTURE XXV.

DISEASES OF THE TESTICLE.

Before we proceed to the morbid structures of the testes, it may not be unacceptable to give the anatomy of those parts in their healthy state, and in order the more effectually to facilitate that

object, the descriptions will be illustrated by drawings from actual dissection, and coloured after nature.

THE ANATOMY OF THE TESTES.

(Extracted from Sir Astley Cooper's Work on the Testes.)

The testes are contained within the scrotum, at which they are suspended at unequal heights; for the left testis very generally hangs lower than the right. Two advantages arise from this circumstance—First, that when the thighs are approximated, they are not pressed against each other; but one being received above the other, they are enabled to elude the violence which they would otherwise sustain:—Secondly, this difference in their heights permits the suspension of the penis to the left side, instead of its being placed directly forwards. Relative situation of the testes.

SCROTUM.

This part is composed of two portions of the common integuments united in the middle; and the place of their union forms a prominent line, which is called raphe. This line, which begins at the frænum, descends under the penis to the scrotum, passes in the centre of the perinæum, and is lost at the anus. The skin of the scrotum is abundantly vascular, and secretes perspirable and sebaceous matter; and the sebaceous glands are chiefly placed in the line of the raphe. Scrotum.

The scrotum varies greatly in its appearance and size; for under the influence of cold, it is small, contracted, and wrinkled; under heat, it is relaxed, smooth on its surface, and greatly extended.

The arteries which supply it with blood, are three in number on each side—*viz.*: the external pudic; the perineal artery of the internal pudic; and, thirdly, an artery from the epigastric. The *external pudic* is the second branch of the femoral artery, springing from that vessel a little below Poupart's ligament, and beneath the Its arteries.

origin of the external epigastric artery. The pudic divides into two branches:—the first passes to the upper part of the scrotum, and crosses the spermatic cord, at which part it sends branches to the fore-part of the scrotum, after which it supplies the skin of the penis and pubis; this artery is necessarily divided in the operation for castration and strangulated hernia. The second branch of the external pudic descends upon the side of the scrotum, and supplies its lateral portion with vessels.

The second artery of the scrotum is the *perineal*, which proceeds from the internal pudic artery; which latter vessel, after passing out of the pelvis, near the sciatic nerve, at the edge of the pyriformis, and at the lower part of the ischiatic notch, is continued to the inner side of the tuberosity and ramus of the ischium; and after having given off its external hemorrhoidal artery to the anus, it sends its perineal branch forwards between the bulb and crus penis. The perineal artery passes upon the septum scroti, supplying it with blood-vessels, and is continued forwards to the raphe where it anastamoses with the external pudic. In its course it sends vessels to the accelerator urinæ and transversus perinei. The *scrotal artery* of the epigastric descends from the epigastric soon after its origin. It first sends a branch down upon the spermatic cord, which is distributed to the cremaster muscle; and then a larger branch descends upon the side of the symphysis pubis to the skin and fat of the pubis; it next anastamoses with the external pudic artery, and descends to the inner and upper part of the thigh, and to the back-part of the scrotum, anastamosing there with the perineal and external pudic arteries.

Veins of the scrotum.

The veins of the scrotum return their blood by the side of their corresponding arteries: the external pudic vein passes into the femoral vein at the groin, the perineal vein into the internal pudic vein, and the veins at the back of the scrotum into the epigastric vein. The skin of the scrotum is so thin, that the veins may be seen through it.

Absorbents.

The absorbent vessels of the scrotum are large and numerous: they pass into the glands of the groin below Poupart's ligament; so

PLATE I. B.—ANATOMY OF THE TESTES.

This shows the origin, course, and insertion of the cremaster muscle.

Fig. 1.

a, tendon of the external oblique muscle.

b, internal oblique.

c c, its tendinous sheath on the rectus.

d d, rectus muscle.

e e, superficial fascia of the spermatic cord.

f, origin of the cremaster muscle from Poupart's ligament, and from between the internal oblique and transversalis muscles, with which it blends.

g, its attachment to the sheath of the rectus.

h h h, the loops which are brought down by the descent of the testis into the cremaster.

i, the testis, and the insertion of the cremaster.

Fig. 2. The tendinous sling formed by the cremaster to cover the testis.

a, fibres of the cremaster enveloping the spermatic cord.

b b, the sling formed by the cremaster upon the tunica vaginalis.

PLATE I B

Fig 1

Fig 2

that when the scrotum is diseased, the irritation is extended to the inguinal glands.

The nerves of the scrotum are derived from three sources.

First, from a *lumbar scrotal nerve*, which arises from the first and second lumbar nerves. It passes over the quadratus lumborum, to send branches to the abdominal muscles and to the skin. It penetrates the internal oblique muscle on the inner side of the spinous process of the ilium, and over Poupart's ligament. It takes its course between the tendon of the external oblique and the internal oblique muscles, and with the spermatic cord penetrates the external abdominal ring, and directly divides into numerous branches, which supply the skin of the groin, the scrotum, and skin of the root of the penis. Nerves of the scrotum.

Secondly, the *external spermatic nerve*, which passes from the second lumbar nerve, and is distributed to the cremaster, and to the cellular tissue of the scrotum. It also sends a branch under Poupart's ligament to the skin of the groin, and of the inner and upper part of the thigh.

The *perineal nerve*, or pudendus inferior, accompanies the perineal artery, passes between the accelerator urinæ and erector penis, and divides into two sets of branches:—the first passes to the skin of the scrotum laterally; the other set is continued to the septum scroti, and to the centre of the fore-part of the scrotum: it also gives branches to the rectum, sphincter ani, transversus perinæi, and accelerator urinæ.

DARTOS.

On the inner side of the integuments of the scrotum a muscle is supposed to exist, which is called the dartos, and to which the motions of this part have been attributed; but it exists only in the imagination of the anatomist: for it is clear that the motions of the scrotum are not the result of muscular action; they are vermicular, gradual, and not sudden contractions; they are not voluntary; they Dartos.

are not obedient to the mind; but they result from changes of temperature, and therefore seem to depend upon the lessened diameters of the arteries and veins of the part, and of the diminished quantity of blood which they contain.

CELLULAR TISSUE OF THE SCROTUM.

Cellular tissue

Within the scrotum a long loose reticular membrane is found, which proceeds from the inner side of the integuments to the external covering of the spermatic cord and testis. Nature has formed it rather reticular than adipose, to prevent any increase of bulk under corpulency. It is long and loose, to permit of great freedom of motion in the testis, and to enable it to elude the influence of violence.

Opposite to the raphe it is more condensed than at any other part, and it is there named the septum scroti; although it is not truly a septum, for it is permeable to air and water; and when the scrotum is œdematous, the dropsical effusion passes through the septum, so that the whole of the reticular membrane is distended.

From the septum scroti, reticular fibres pass to the covering of the testis, to preserve each testis in its situation.

The septum scroti is supplied with blood from the perinæal artery, and that vessel anastamoses freely with the external pudic. When the testis, in a diseased state, adheres to the septum, these vessels are greatly enlarged, and often furnish a troublesome hemorrhage, if each divided vessel be not secured in a ligature.

SUPERFICIAL FASCIA OF THE CORD.

Superficial fascia.

When the scrotum, and the cellular tissue with which it is lined, are removed, the spermatic cord appears covered with this fascia, which also descends to the testicle. It first proceeds from the surface of the tendon of the external oblique muscle of the abdomen, which it covers, and it is joined to the edges of the external

abdominal ring, and from thence descends upon the spermatic cord to the lower part of the testis. It is internally attached to the cremaster muscle and its tendon; externally to the cellular tissue of the scrotum. It forms a purse, to support the testicle when the scrotum is relaxed; it attaches the testicle to the scrotum by sending to it a reticular membrane, and it envelopes and connects the superficial vessels and nerves with the spermatic cord.

CREMASTER MUSCLE.

This muscle next appears in the course of the dissection, enveloping the spermatic cord, covering it entirely, and inserted into the tunica vaginalis; but as the cremaster belongs to the cord as well as to the testis, I will proceed with the dissection of the testis, and afterwards describe the cremaster. Cremaster.

TUNICA VAGINALIS.

This membrane, when first raised, is found to be covered entirely by the tendon of the cremaster muscle, which envelopes its outer surface, and is inserted into it; and until this be cut through, the true tunica vaginalis does not appear. Tunica Vaginalis.

When the insertion of the cremaster muscle is cut away, the tunica vaginalis is found to be a very delicate and thin membrane, formed from the peritoneum, and descending from the abdomen before the testis. It is composed of two portions: the one loose and detached from the testis, excepting posteriorly and laterally; the other, which adheres to the surface of the tunica albuginea, and which covered the testis whilst in the abdomen; but when examined in the scrotum, the two portions are connected, and are continuations of each other.

The first, or loose portion, is the tunica vaginalis reflexa, and the adhering portion the tunica vaginalis testis: between the first and second there is a cavity, into which a vapour, or halitus, is naturally Tunica vaginalis reflexa.

secreted, and which, when poured out in a diseased quantity, produces the complaint which is called hydrocele.

The tunica vaginalis is a reflected membrane, like the pericardium, pleura, and peritoneum. The tunica vaginalis reflexa passes loosely over the fore-part and sides of the testis; and being continued to its posterior edge, there turns over the epididymis to the surface of the testicle, covering and adhering to the tunica albuginea; and in a similar manner on the other side, excepting on that side there is no epididymis.

Tunica vaginalis testis.

The tunica vaginalis testis can be dissected from the tunica albuginea but to a short distance, as it soon becomes incorporated with the surface of that membrane.

Behind the tunica vaginalis reflexa, and the tunica vaginalis testis, the testicle is placed, contained in its tunica albuginea; and the spermatic vessels, the vas deferens, the absorbents, and the nerves of the testicle enter it posteriorly, and do not penetrate the tunica vaginalis; and the testis may be cut into behind, without injury to that tunic.

Relative position of all the coverings.

In this dissection, then, the scrotum is first cut through; next the cellular tissue; thirdly, the fascia superficialis; fourthly, the cremaster muscle; fifthly, the tunica vaginalis reflexa; sixthly, the tunica vaginalis testis; and then the testis, with its covering of tunica albuginea, is exposed.

The tunica vaginalis is a serous membrane, and forms a cavity, which communicates with the peritoneum and cavity of the abdomen before birth, but is usually shut after birth by adhesion, when it becomes a small thin cord, situated on the fore-part of the spermatic vessels. The fluid which it secretes, when abundant, has the colour and other properties of serum, being a solution of albumen. It is coagulable by heat, and various chemical agents. The tunic is supplied with vessels from the spermatic artery, and artery of the vas deferens, from which its halitus is secreted. Its veins open into the spermatic veins. Its absorbents pass upon the spermatic cord with those of the testis and with them into the

PLATE II.—ANATOMY.

Views of the tunica vaginalis and tunica albuginea.

Fig. 1. Shows the tunica vaginalis.

a, spermatic cord.

b b b, the cremaster.

c c, the tunica vaginalis reflexa.

d, tunica vaginalis on the epididymis.

e, tunica on the testis.

Fig. 2. A front view of the tunica vaginalis.

a, spermatic cord.

b b b b, tunica vaginalis reflexa.

c, epididymis covered by the tunica vaginalis.

d, testis covered by the tunica vaginalis testis.

e e, serous cavity.

Fig. 3. Posterior view of the testis and tunica vaginalis.

a, spermatic cord.

b, vas deferens.

c c, cords or ligaments of the vas deferens.

d d d, testis devoid of the tunica vaginalis.

e e, tunica vaginalis.

Fig. 4. A diagram of the reflexion of the tunica vaginalis.

a, the testis.

b, tunica albuginea and back of the testis, devoid of the tunica vaginalis.

c c c, tunica vaginalis reflexa.

d d d, tunica vaginalis testis covering the surface of the tunica albuginea, and incorporated with it.

abdomen; and its nerves are in part derived from the spermatic plexus, and in part from a branch of the external spermatic. It possesses considerable sensibility, and, irritation of it produces sickness. In the healthy state, when opened, no fluid is found in it; but a vapour arises, and it becomes dry.

When the tunica vaginalis reflexa is opened, the cavity which is situated between it and the tunica vaginalis testis, is exposed; and through the latter membrane, which is semi-transparent, the tunica albuginea testis appears. The general form of the testis and epididymis may be observed, the latter being placed upon the upper posterior, and outer part of the testis; beside which a little vascular membranous body is also seen upon the anterior extremity of the caput epididymis. Epididymis.

OF THE TESTIS.

This organ is oviform, and its largest extremity is placed upwards and forwards. It is situated obliquely, being neither horizontal nor perpendicular, but in the diagonal of the two. Testis.

It is divided into anterior and superior, posterior and inferior extremity; into anterior and inferior, posterior and superior edge; and into its two lateral surfaces. Its anterior edge is most rounded; the posterior least so; the two sides are convex, although flatter than the anterior edge. At the posterior edge the spermatic vessels enter, and this part is devoid of the tunica vaginalis. The upper extremity of the testis is capped by the epididymis.

The axes of the testis are three: the longest is two inches in a healthy well-formed testis, and it passes from the anterior and upper extremity to the posterior and lower. The second axis is one inch and a half, and it passes from the posterior superior, to the anterior and inferior edge; whilst the third, or transverse diameter, passing from side to side, is one inch and one-eighth in length. The weight of a healthy testis and epididymis is about an ounce.

OF THE TUNICA ALBUGINEA TESTIS.

This strong fibrous membrane forms a complete covering to the Tunica albuginea testis.

glandular structure of the testis, leaving a cavity in which it is contained; but at the upper and posterior part of the testis, a little to its outer side, the tunica albuginea turns in towards the centre of the testis, and forms a triangular process, which, from its situation, I should call mediastinum testis.

This inverted portion of the tunica albuginea sends forth numerous ligamentous cords. Some of these cords pass directly from the mediastinum to the anterior edge of the testis, and form pillars, which are strongly fixed to the inner side of the tunica albuginea, to prevent the separation of its sides; others, and the greater number, but smaller cords, descending upon the seminiferous tubes, send forth lateral membranes, which form purses, to enclose the lobes into which the glandular structure is divided; and these are met by similar ligamentous cords and membranes from the inner surface of the tunica albuginea, to complete the envelope of the lobes of the testis.

The tunica albuginea, therefore, is not merely a simple bag to enclose the glandular structure of the testis, but it forms a process which splits into ligamentous cords; and these send forth lateral membranes, which divide the glandular structure into lobes, in which the seminal tubes are contained.

The membranes and cords not only support and connect the seminal tubes, but they form beds, upon which arteries, veins, absorbent vessels, and nerves, are spread. They have been called septa; but they really envelope the seminiferous tubes, convey to them the blood, and form bags, which support, confine, protect, and nourish the tubular structure of the testis.

The outer surface of the tunica albuginea is covered by the tunica vaginalis testis, and this is formed of the peritoneum, which covered the testis whilst still in the abdomen. It is very thin, and is soon incorporated with the surface of the tunica albuginea, from which it can be separated only to a small extent; but as it is a serous membrane, it renders the outer part of the tunica albuginea a secreting surface.

The tunica albuginea is by dissection farther divisible into two layers or portions. The outer tunic is fibrous, tendinous, and

inelastic, resembling the sclerotic coat of the eye, and external portion of the dura mater; and like other tendinous structures, it is endowed with but little vascularity. It is strong and inelastic, to protect the tender tubular substance of the testis from violence; for the most severe blow or pressure rarely injures it, whilst suspended in its natural situation; and although extravasations of blood into the tunica vaginalis are not uncommon, yet the testis generally escapes any severe injury; as blows inflicted upon the eye produce great ecchymosis in its neighbourhood, yet how rarely is the eye itself ruptured.

The inner coat or layer of the tunica albuginea I should call the tunica vasculosa; for in it the spermatic artery ramifies. It is easily separated by dissection from the outer layer, excepting at the anterior edge of the testis, where some of the internal ligamentous cords are fixed; but it may be entirely separated from the outer layer of the tunica albuginea, so as to form a separate preparation, enclosing the tubuli, and leaving the outer layer of the tunic with the spermatic cord. This tunica vasculosa is easily demonstrated, by filling the arteries and veins with fine injection: the testis is then cut open, and the tubuli removed, when this membrane is seen highly vascular on the inner part of the tunica albuginea.

Whilst the outer layer bears a strong resemblance to the dura mater—like it being tendinous and inelastic, and like it forming processes internally—the inner membrane of the tunica albuginea resembles the pia mater, being reflected inwards on the lobes of the testis, and forming a bed, on which the branches of the spermatic artery ramify, and supplying with vessels the membranes which envelope the tubuli.

The arteries which supply the tunica vasculosa pass between this coat and the proper tunica albuginea before they divide into minute branches, to supply the membrane which is reflected inwards. Some branches of the spermatic veins also ramify upon the surface of this membrane; but the greater number pass, upon the ligamentous cords, into the glandular substance of the interior of the testis, and upon this membrane absorbent vessels are also found.

OF THE LOBES OF THE TESTIS.

Lobes of the testis.

The tubuli seminiferi are disposed in numerous lobes, which are contained in the tunica albuginea. These lobes are pyriform: their stalk, or commencement, is turned to the upper and posterior edge of the testis, and their bases to the anterior and lateral parts of the tunica albuginea. These lobes receive suspensory cords, or ligaments, from the mediastinum testis, which send out membranes, to be spread over the lobes, and which meet others springing from the anterior edge and sides of the testis (see plate); thus the lobes are suspended in the ligaments and membranes, and by them confined in their situation, so as to be incapable of being displaced: for, if the tubes had been merely loosely suspended within the tunica albuginea, they would have been continually liable to derangement from concussion, or to be torn asunder by violence.

OF THE TUBULI SEMINIFERI.

Tubuli Seminiferi.

The cavity formed by the tunica albuginea is in a great measure filled by the tubuli seminiferi, which, as I have stated, do not hang loosely within the cavity, but are divided into two sets of lobes: first, into large lobes, which are enveloped in membranes, and connected with the larger ligaments or pillars of the testis; and, secondly, into an infinite number of small lobes, each also contained within a membrane. The larger lobes are composed of numerous tubuli clustered together; the smaller are formed of a single tubulus, and sometimes of two tubuli. The larger lobes are pyriform, their stalks attached to the rete, their bases to the inner side of the tunica albuginea. They are situated between the stronger pillars of the ligaments of the testis, as they pass from the mediastinum to the inner part of the tunica albuginea; and the vascular membranes by which they are enveloped, pass from one ligament to the other; and the smaller lobes are also disposed in vascular membranes, and supported by smaller ligaments and vessels.

PLATE III.—ANATOMY.

Fig. 1. Shows the external portion of the tunica albuginea cut open, and turned aside to show the internal vascular layer, with the spermatic artery taking its tortuous course upon it. With care, this layer may be entirely dissected from the thicker tendinous coat.

a, spermatic cord.

b b, external portion of the tunica albuginea cut open.

c, the internal vascular layer.

Fig. 2. Minute injection of the spermatic artery; yet the vessel is filled with a coarse injection.

a, the spermatic artery sending branches to the cord.

b, arteries of the epididymis.

c c c, spermatic artery in the testis, displaying its arches below, and its inverted branches first ascending and then descending.

d, another, and superior arch in the mediastinum.

e, artery accompanying the vas deferens, arising from a vesical artery of the hypogastric.

Fig. 3. Shows the deferential artery.

a, the testis.

b b, vas deferens.

c, spermatic artery.

d d, the deferential artery anastomosing with the spermatic.

Fig. 4. Perpendicular and longitudinal section of the testis.

a a, mediastinum testis.

b b, the lobules of the tubuli attached to the mediastinum, and proceeding to the tunica albuginea, on which the vascular enveloping membrane appears.


Fig. 1
Fig. 2
Fig. 3
Fig. 4

Each tubulus begins from one of the canals which form the rete; and, passing through a small hole in the mediastinum testis, it becomes excessively convoluted, and forms a conical or pyriform body, the basis of which is turned to the inner side of the tunica albuginea, and the convolutions are placed nearly at right angles with the long axis of the tubulus. Each tubulus may be unravelled, when it is found to be composed of a long, single, and convoluted vessel, the convolutions disposed nearly in parallel lines, and nearly transversely to the long axis of the lobe.

With these tubuli, thrown into larger and smaller lobes, and supported by ligaments from the mediastinum, is the cavity of the tunica albuginea filled. The blood-vessels distributed upon the lobes are as follows:—First, the *spermatic artery* passes in two large branches on the opposite side of the testis to the epididymis; and between the outer and inner layer of the tunica albuginea, they are continued upon the inner coat towards the anterior and inferior edge of the testis. There they form an arch of communication, from which vessels pass upwards and backwards upon the membranes which cover the lobes of the tubuli; and when they have reached two-thirds of the way to the mediastinum, they divide into two branches, which turn back on each side towards the anterior edge, and supply the membrane abundantly with vessels. The smaller lobes receive a little vessel at each extremity.

The principal branches of the *spermatic veins* enter the testis in a different manner to the arteries; a few pass on each side upon the surface of the lobes, but the greater number descend upon the mediastinum, and are continued upon the ligaments of the testis, between the larger lobes, to the anterior edge, where they become inverted, to be distributed upon the extremities of the larger lobes; and they also meet some small veins which pass in at the anterior edge, and which are distributed upon the extremities of the lobes.

OF THE RETE.

By the term Rete, is meant a set of canals which receive the

Rete.

semen from the tubuli; and it is to be distinctly understood, that these canals are not placed in the cavity of the tunica albuginea, as the tubuli are, but that they are situated between the layers of the tunica albuginea itself, in a substance which I have called the mediastinum. This substance is placed at the posterior edge of the testis, but a little inclined to its outer side; and it is situated opposite to the epididymis.

Manner of dissecting it.

To dissect this structure clearly and distinctly first make a transverse section of the testis, and then, looking at its divided edge, it will be seen that the tunica albuginea is at that part readily divisible into three layers. The first layer turns upon the spermatic cord, uniting with the sheath which covers its vessels. The second layer unites with a similar layer on the opposite side, and forms a thick substance, between the fibres of which, interstices are left for blood-vessels and absorbents: whilst the internal layer, uniting with that on the opposite side, as well as with the preceding layer of the tunica albuginea, forms the process which I have called mediastinum, which projects into the testis between the tubuli; and it is in this substance that the seminal canals of the Rete are placed. The mediastinum is therefore composed of two bodies—the upper placed towards the spermatic cord, the lower towards the centre of the testis:—in the upper are situated blood-vessels; in the lower, the canals of the Rete; and from the lower proceed the pillars which are stretched to the inner side of the tunica albuginea, to bind its sides together, and smaller ligaments are also sent to the lobes of the tubuli, to envelope and support them.

If an incision be made in the long axis of the testis, from one extremity to the other, the mediastinum will be seen projecting downwards and forwards amidst the tubuli, reaching more than three-fourths the length of the testis, and its edge terminates in forming its ligaments. In a testis which measured an inch and three quarters, the mediastinum was an inch and an eighth in length.

Canals in the rete

In the whole length of the mediastinum, canals are passing, which form the rete, and when a transverse section is made of the mediastinum, these canals are very visible to the naked eye: they

pass in a longitudinal and waved direction, from the posterior to the anterior part of the mediastinum, and are situated in it more to the anterior and lower than to the posterior edge of the testis. And hence I have observed that the mediastinum is composed of two parts: the back part of blood-vessels; the anterior of seminal canals, which form the rete.

In these canals of the rete, the tubuli terminate by single vessels, which pass through small apertures, between the ligaments of the mediastinum, and they enter the anterior edge, as well as into the sides and extremities of the rete: but at the posterior edge of the mediastinum they do not enter. The rete terminates at the upper and posterior extremity of the testis, by forming the vasa efferentia. The mediastinum descends towards the centre of the testis, and the central tubuli there enter it, whilst the others pass into its sides. The back part of the mediastinum has a very convoluted artery passing from one extremity to the other. The veins also ramify upon the back of the mediastinum, and send vessels through it, which pass between the ligaments and lobes of the tubuli.

Mode of injecting them.

Having traced the canals of the rete, and found that they were situated in, and completely enclosed in the tunica albuginea, it struck me that I might inject these tubes with glue, or even coarse injection, by passing a fine silver or steel pipe into the canals of the rete; and having made trial of this plan, I have injected the tubuli seminiferi with coloured fine injection, and the vasa efferentia were also readily filled, and have been thus able to make some beautiful preparations, more easily dissected, and much less easily spoiled, than those which are made by injecting the tubes with quicksilver. The rete can even be filled with coarse injection; and the beginnings of the tubuli and the vasa efferentia will receive the injection. If the injecting pipe be placed in the back of the mediastinum, the injection readily escapes into the absorbent vessels, and those of the spermatic cord become filled.

OF THE VASA EFFERENTIA.

Vasa efferentia.

The tubuli contained in the cavity of the tunica albuginea and

the canals of the rete, situated between the layers of the same tunic, compose the bodies of the testis; and the seminal vessels next in order are the vasa efferentia. These vessels are placed between the testis and epididymis, and become therefore the medium of communication of the testis and its appendix, the epididymis. They proceed from the anterior and upper extremity of the rete, and pass to the epididymis, in which they terminate. The greatest number of these vessels which I have seen is fifteen, and from thirteen to fifteen exist in a healthy testis; but they are very often found in a diseased state, and obliterated so as to be reduced to the number of six or seven; but this does not prevent the organ from continuing to perform its functions, as the semen is still readily conveyed by the remaining channels into the epididymis.

Origin in the Rete.

The vasa efferentia arise singly from the rete, and they terminate in the epididymis, in different parts of it, so as to leave the epididymis a single tube. Prior to their termination, they each form a conical body, in which the seminal tube is divided with extreme minuteness, just before its termination in the epididymis. A small band of communication is continued along the surface of the vasa efferentia, to receive the termination of those vessels. Between the vasa efferentia and the lobes which they form, strong ligamentous cords are found, intended for the purpose of strengthening the connection between the testis and epididymis; and the tunica vaganilis which is reflected over them, is a denser structure than in other parts. The vasa efferentia have the general form and character of the tubuli testis, only that their direction is reversed; they begin from the rete, in single vessels, a little convoluted, and then, by their excessive convolutions, they are formed into conical bodies: they differ from the tubuli in sending forth a vessel to the epididymis, instead of terminating in a blind extremity. The first vas efferens has the readiest communication with the epididymis, the second a smaller, and so on, although they all ultimately communicate with it.

OF THE EPIDIDYMIS.

Epididymis.

This body may be considered as an appendix to the testis, and

PLATE IV.

Fig. 1. Veins of the spermatic cord and testis filled with coarse injection, and unravelled.

a, testis.

b, the epididymis.

c, vas deferens, with some curious sacs upon it, three of which are seen.

d, first cluster of veins.

e, second cluster of veins.

f, veins accompanying the vas deferens.

g g, communicating veins between *d*, *e*, and *f*; several veins are seen coming from the epididymis.

Fig. 2. Tubuli injected.

a a, tubuli.

b, the rete.

Fig. 3. A similar section showing the rete and tubuli.

Fig. 4. Tubuli injected with red glue, and unravelled.

Fig. 5. Vasa efferentia injected with coloured glue.

a, their lobes.

Fig. 6.

a, tubuli.

b, rete.

c, vasa efferentia terminating in the epididymis.

d, a little sac upon the vasa efferentia, often found.

e e, epididymis.

f, epididymis unravelled.

Fig. 7, epididymis.

a, caput.

b, the body.

c, cauda.

PLATE IV. *(continued.)*

Fig. 7. *(continued.)*

d, the vas deferens.

e, membranous bands at the lower arch.

f f, membrane at the upper arch.

g g g, ligaments supporting and dividing the lobes.

h, the testis.

Fig. 8. Shows the lobes of the epididymis.


Fig. 1

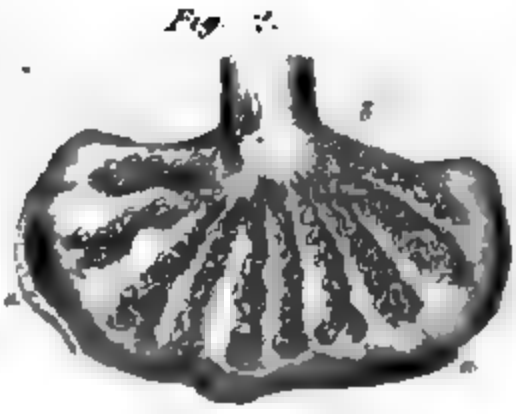


Fig. 2.


Fig. 3


Fig. 4


Fig. 5

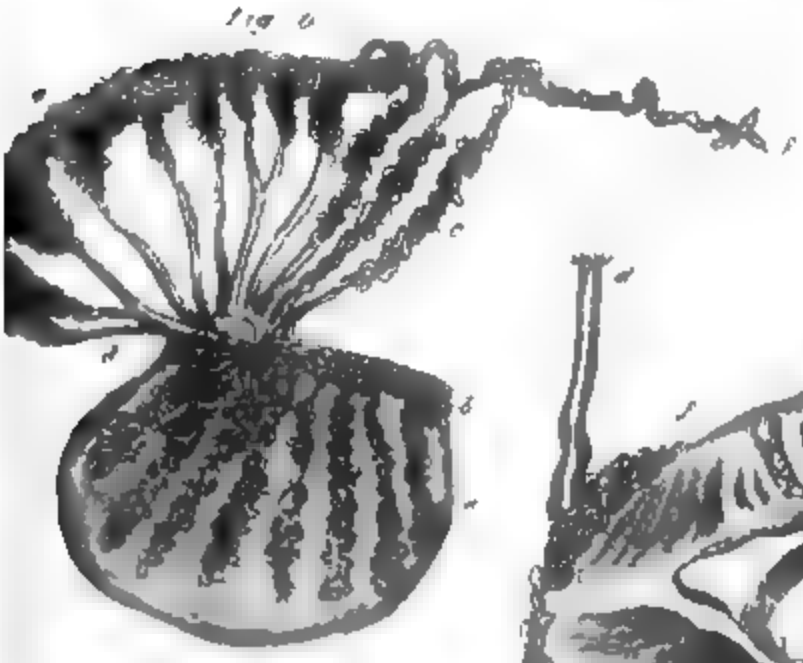
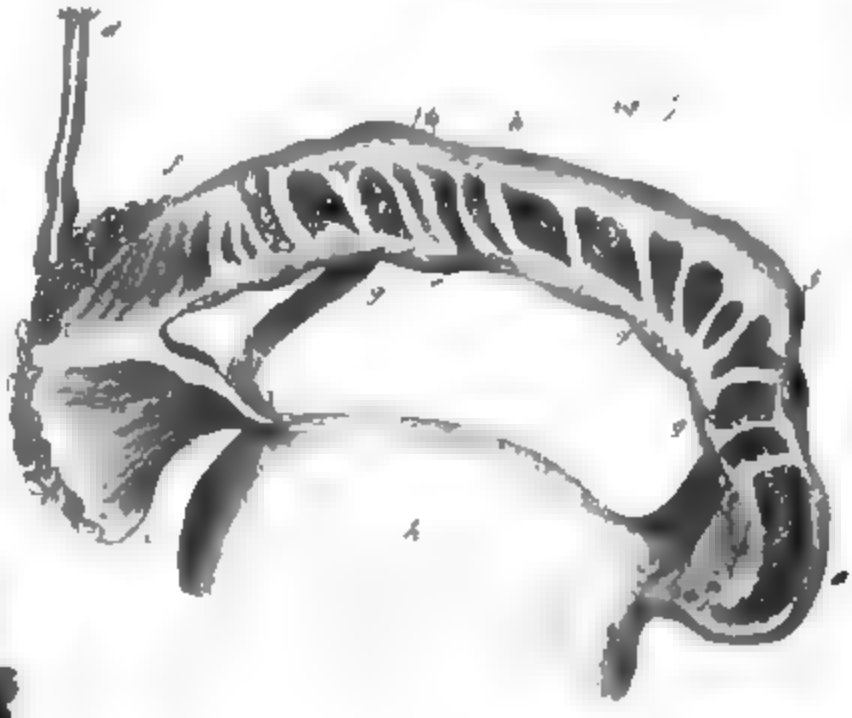
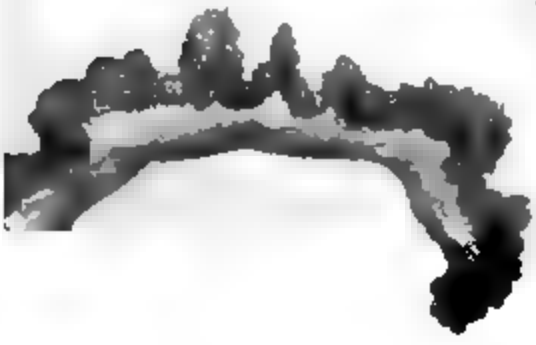


Fig. 6





its name is derived from its being placed upon this organ, as the testes were anciently called didymi.

It is of a crescentic form; its upper edge is rounded, its lower edge is thin. Its anterior and upper extremity is called its caput, the middle part its body, and the lower part its cauda. The caput and cauda have been called globus major and minor; but there is no enlargement entitled to the name of globus minor. The epididymis is covered by the tunica vaginalis reflexa. The tunica vaginalis testis is continued from the side of the testis towards the epididymis, and passes directly over its caput and cauda; but in the centre it passes under the body of the epididymis to the spermatic cord; then turns, and lines the inner side of the epididymis, and rises over its sharp edge, to cover the upper part of its body, being continued, to form the tunica vaginalis reflexa. The cauda it covers superficially. The caput it closely invests. Its form.

Thus each extremity of the epididymis is confined to the testis; but at its centre there is a hollow between the two, into which the point of the finger may be passed, and which is lined by the tunica vaginalis.

When the tunica vaginalis is raised from the epididymis, numerous cords and branches of blood-vessels, may be observed passing into it from the posterior to the anterior extremity, dividing it into lobes; and these cords are the insertions of the cremaster muscle into the epididymis. They also form bands, which prevent the convolutions of the tubes from being displaced.

OF THE CAPUT EPIDIDYMIS, OR GLOBUS MAJOR.

This part, although so called, is principally formed of the lobes of the vasa efferentia, named by some anatomists coni vasculosi, which are not situated in a single line, but some are placed behind others; so that the end of the epididymis is curved, and double. Caput Epididymis.

Between these lobes are formed tendinous cords, which separate and support them; and on the upper part of the vasa efferentia a

band of epididymis passes, which receives a vessel from each lobe of the vasa efferentia.

OF THE CAUDA EPIDIDYMIS.

Cauda.

Its cauda terminates in the vas deferens, the tube of which is larger and less convoluted than that of the epididymis; and this is their chief distinction. But in injecting the testicle, the quicksilver is with difficulty made to pass from the vas deferens into the epididymis, in consequence of the sudden turn the tube here makes, and from its being bound down by cords proceeding from the cremaster muscle.

OF THE BODY OF THE EPIDIDYMIS.

Body.

The body of the epydidymis is entirely composed of the convolutions of a single seminal tube thrown into lobes; and the convolutions pass in parallel lines from edge to edge.

This part is smaller than the head of the crescent. That it is composed of a single tube, is not only shewn by its being capable of being entirely unravelled after maceration; but to the learner it is easily demonstrated by unravelling it at any one part.

It is subject to some varieties. First, I have seen it naturally unravelled in its centre, to the extent of three-quarters of an inch; and, secondly, it very frequently sends forth an additional vas deferens, from one to three inches in length, along the spermatic cord; and I have a preparation of three of these in the same testicle, each terminating in a blind extremity.

OF THE VAS DEFERENS, OR DUCTUS SPERMATICUS.

Spermatic duct.

This duct begins from the cauda epididymis, and it terminates in the duct of the vesicula seminalis, the combined vessels opening at the veru montanum in the prostatic part of the urethra.

Its course.

At its beginning from the epididymis it is doubled upon that body,

and bound down, by the tendinous fibres and insertions of the cremaster. It is at its beginning very much convoluted, though less so than the epididymis; and it does not form any distinct lobes. It descends below the cauda of the epididymis at its commencement, and for the first inch its convolutions are numerous; in the second inch of its ascent they become less in number; and in the third inch, from its beginning, in a great degree disappear. It then ascends to the external ring, passes through the inguinal canal, emerges at the internal ring, there entering the abdomen.

It then quits the spermatic artery and vein, crosses the edge of the psoas muscle, and descends into the pelvis—first, by the side of the bladder; and, secondly, behind it, and between the vesiculæ seminales to the prostate gland.

The vas deferens is enclosed in a sheath, formed by the tendinous fibres of the cremaster, and is supported by ligaments of its own, which descend from the internal ring, which sheath may be readily found in the first three inches of the tube from the epididymis. The ligaments are intended to strengthen the connection of the testis to the body, to support the testis, and to preserve the convolutions of the vas deferens, for which its two lateral bands are particularly designed.

Its relative position, &c.

It is situated posteriorly in the spermatic cord; and there is a space of a quarter to half an inch between it and the spermatic artery and vein.

It is round and hard, and is thus easily distinguished from the other vessels.

Structure, &c.

It is distinctly muscular in the bull, and its fibres take a circular direction, as may be readily seen in that animal, by examining the enlarged part of the vas deferens, which is situated behind the bladder.

Where these vessels are placed between the vesiculæ seminales, they become enlarged, and their interna surfaces cellular, secreting a fluid which mixes with the semen.

The structure of the vas deferens near its termination bears a strong resemblance to that of the vesiculæ seminales.

PLATE V.—ANATOMY.

Fig. 1. Different views of the tubuli, spermatic cord and inguinal canal laid open.

a a a, tubuli.

b, rete.

c c, vasa efferentia.

d, caput epididymis.

e, cauda epididymis.

f, commencement of the vas deferens.

g, vas deferens.

Fig. 2. Shows the whole structure injected with mercury.

a, the tubuli.

b, the rete.

c c c, vasa efferentia.

d, the body of the epididymis.

e, the caput epididymis.

f, the cauda epididymis.

g g g, the vas deferens.

Fig. 3. Shows the fascia transversalis united to the spermatic cord in its passage.

a a, Poupart's ligament.

b, the cremaster arising from it.

c, the spermatic cord below the external ring.

d, the cremaster passing over the cord.

e, cremastic artery arising from the epigastric.

f, the vein.

g, the external portion of the fascia transversalis.

h, internal portion of the fascia transversalis, covered by muscular fibres from the transversalis.

i, the cord united by a thin layer to the fascia transversalis.

Fig. 4. Showing the inguinal canal laid open, and course of the spermatic cord.

a a, Poupart's ligament.

b b, the internal oblique muscle.

PLATE V. *(continued.)*

Fig. 4. *(continued.)*

c c, transversalis muscle arising from Poupart's ligament, and passing around the spermatic cord at the internal ring, so that the fibres of this muscle appear behind as well as before the spermatic cord, and thus the inguinal canal is rendered a muscular canal.

d, the cremaster muscle, arising from Poupart's ligament, between the internal oblique and transverse muscles, and receiving fibres from the transversalis behind the cord.

e e, rectus muscle.

f, its sheath from the internal oblique and transverse muscles.

g, the superficial fascia of the cord.

h h, spermatic cord.

i, internal ring.

k, external ring.

Fig. 5. Internal view of the inguinal canal.

a a, Poupart's ligament.

b, internal oblique muscle.

c, transversalis muscle.

d, rectus.

e, spermatic cord.

f, internal portion of the fascia transversalis with the transversalis muscle passing upon it, to be fixed in Poupart's ligament.

g, muscular fibres seen through the fascia.

h, fascia transversalis, and transversalis muscle, forming the inner portion of the inguinal canal, above which is seen the linea semilunaris.

i, the origin of the transversalis muscle from Poupart's ligament, and the manner in which it is twisted round upon the fascia transversalis, to be inserted into it, and into Poupart's ligament.

PLATE V

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PLATE V

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When the artery reaches from one to three inches from the epididymis, varying in different subjects, it divides into two branches, which descend to the testicle on its inner side, opposite to that on which the epididymis is placed; one passing on the anterior and upper, the other to the posterior and lower part of the testis.

From the anterior branch, the vessels of the epididymis arise: First, one passes to its caput; secondly, another to its body; and, thirdly, one to its cauda and the first convolutions of the vas deferens, communicating freely with the deferential artery.

The spermatic arteries, after giving off branches to the epididymis, enter the testis, by penetrating the outer layer of the tunica albuginea; and dividing upon its vascular layer, they form an arch by their junction at the lower part of the testis, from which numerous vessels pass upwards; and then descending, they supply the lobes of the tubuli seminiferi.

Beside this lower arch, there is another passing in the direction of the Rete, extremely convoluted in its course, and forming an anastomosis between the principal branches.

OF THE SPERMATIC VEINS.

Spermatic veins.

There are two veins at their terminations in *the abdomen;* for they may be said to begin at the extremities of the arteries in the testis, and to terminate in the abdomen. On the right side, the spermatic vein ends in the inferior cava, nearly opposite to the origin of the spermatic artery; and on the left side, in the renal or emulgent vein.

They enter the abdomen at the internal ring, and pass in contact with the arteries, near to the kidneys, before they quit them to terminate in the manner which I have stated.

Two or three veins often accompany each spermatic artery in the abdomen; and similar branches also cross upon the coats of the artery, and form several anastomoses; but they unite into one before they terminate.

In the inguinal canal they are placed with the spermatic artery;

but one divided into two, three, or more vessels, beside some small communicating branches.

When examined below the external ring, they will be found as follows :—

Three sets spring from the testis, one from the rete and tubuli, and another from the vascular layer of the tunica albuginea, and a third from the lower extremity of the vas deferens.

The veins of the testis pass in three courses into the beginning of the spermatic cord; two of these quit the back of the testis—one at its anterior and upper part, and a second at its centre; and these, after passing from two or three inches, become united into one. The other column accompanies the vas deferens. There is also a large vein just above the testis, which crosses to join the three columns.

The veins of the epididymis are, one from the caput, another from its body, one from its cauda, and another from its junction with the vas deferens, besides some small branches; they terminate in the veins of the spermatic cord.

The veins of the cord below the external ring divide into numerous branches, which are not only turned and twisted upon each other, but very frequently communicate; so that, although they have valves, like other veins, they may be injected contrary to the course of the blood, by the injection traversing from one to the other. These vessels have been absurdly called the vasa pampyniformia.

When we consider the length of the spermatic arteries and veins, and the numerous convolutions which they make, and remember that they are living tubes, whose directions are constantly changing, it must be obvious that nature has designed to make the circulation slow, the secretion elaborate, and that she has defended the tender structure of the testis from the danger of an impetuous current.

This tardiness of circulation is further secured by the number and great size of the spermatic veins, when compared with their accompanying arteries.

PLATE VI.—ANATOMY.

Fig. 1. Shows the deferential and cremasteric artery.

a, the bladder.

b, vesicula seminalis.

c c c c, vas deferens.

d, the testis.

e, the ureter.

f, hypogastric artery.

g g, remains of the umbilical artery.

h, vesical artery.

i i i, artery of the vas deferens, or deferential artery.

k, the descending branch of it to the vesicula seminalis.

Fig. 2. Cremasteric artery.

a, testis.

b, transversalis muscle.

c, rectus abdominis.

d, spermatic artery.

e, vas deferens.

f f, epigastric artery.

g, artery from the epigastric.

h h, cremasteric branch.

i, branch to the rectus and pyriformis muscles.

There is a *second artery* in the spermatic cord, which begins from one of the vesical arteries, a branch of the hypogastric, near the remains of the umbilical artery, where several vesical branches arise.

This *deferential* artery divides into two sets of branches, one set descending to the vesicula seminalis, and to the termination of the vas deferens; the other, ascending upon the vas deferens, runs in a serpentine direction upon the coat of that vessel, passing through the whole length of the spermatic cord; and when it reaches the cauda epididymis, it divides into two sets of branches—one advancing, to unite with the spermatic artery, to supply the testicle and epididymis—the other passing backwards to the tunica vaginalis and cremaster.

THE ABSORBENT VESSELS OF THE TESTICLE.

Absorbents.

These vessels arise both from the coats of the testicle and from its internal structure. They unite upon the cord, and form three or four trunks, which ascend upon the spermatic veins:— they pass through the inguinal canal, and when they enter the cavity of the abdomen, their numbers are diminished, but their size is increased;— they ascend with the spermatic vein, on the right side quit it to cross the vena cava, and terminates in three or four absorbent glands by the side of the aorta, near the origin of the spermatic artery. On the left side, they pass into glands in contact with the aorta, just below the renal artery.

The absorbents of the tunica vaginalis terminate in those of the testis.

OF THE DISSECTION OF THE INGUINAL CANAL.

Inguinal Canal.

This canal is bounded at the lower part by the external abdominal ring, formed by the tendon of the external oblique muscle; at its upper part by the internal ring, formed by the fascia transversalis.

In dissecting it, after removing the integuments, the superficial fascia of the tendon of the external oblique muscle is laid bare.

Dissection of the inguinal canal.

An incision is to be made through the tendon of the external oblique, beginning above the abdominal ring, and extending near to the anterior and superior spinous process of the ilium. The edges of the divided tendon being then turned down, the inguinal canal is brought into view.

At the lower part of the canal, just above the abdominal ring, the spermatic cord appears in the centre, the cremaster muscle between it and Poupart's ligament, above it the tendinous insertion of the internal oblique muscle, which passes behind the upper part of the abdominal ring, to the sheath of the rectus muscle.

At the upper part of the canal, in this first view, the internal oblique is seen arising from Poupart's ligament, and crossing over the cord and part of the cremaster muscles in the form of an arch; some of its muscular fibres blend with those of the cremaster.

Upon raising the lower edge of the internal oblique from Poupart's ligament, and turning it upwards, the transversalis abdominis appears. It arises from Poupart's ligament under the internal oblique, and also blends with some of the fibres of the cremaster.

It forms an arch over the spermatic cord, and is inserted, with the tendon of the internal oblique muscle, into the tendinous covering of the rectus. But the lower edge of the transversalis has a very peculiar insertion, which I have hinted at in my work on Hernia. It begins to be fixed in Poupart's ligament, almost immediately below the commencement of the internal ring, and it continues to be inserted behind the spermatic cord, into Poupart's ligament, as far as the attachment of the rectus.

Thus the inguinal canal is endowed with muscular contraction, which, under the action of the abdominal muscles, serves to close it, to lessen the propensity to hernia.

Sometimes a portion of muscle descends from the tendon of the transversalis in the course of the linea semilunaris, to be inserted into the fascia transversalis, behind the cord, and into Poupart's ligament. (see plate.)

It is this circular insertion of the transversalis which is the cause

PLATE VII.—ANATOMY.

The first figure shows the course of the absorbent vessels of the testes accompanying the spermatic cord into the abdomen, and terminating in the absorbent glands of the loins, from which other absorbent vessels spring, to terminate in the thoracic duct.

a, aorta.
b, superior mesenteric artery.
c, inferior mesenteric artery.
d, bifurcation of the aorta.
e, external iliac artery.
f f, internal iliac artery.
g, inferior cava.
h, left iliac vein.
i, right external iliac vein.
k, internal iliac vein.
l, spermatic artery.
m m m m, spermatic vein.
n n, ureter crossing the bifurcation of the iliac vessels.
o o o, vas deferens.
o o, passing through the internal abdominal ring.
p, the testis.
q, the epididymis.
r r, absorbent vessels.
s, absorbents terminating in glands on the inferior cava.
t, an absorbent gland placed below the origin of the spermatic artery, receiving some large absorbent vessels: it is to these glands, *s* and *t*, that diseases of the testes extend.

Fig. 2. Shows the testes passing the inguinal canal.

a, the testis.
b, the epididymis.
c, the tunica vaginalis.
d, the gubernaculum attached to the scrotum.
e, the scrotum.
f, the penis.

[illegible] descended, the tunica

of stricture in inguinal hernia, in the course of the canal, and nearly at the upper ring. Dissection of the inguinal canal.

Behind this insertion of the transversalis, the internal portion of the fascia transversalis appears, adhering strongly to the tendon of that muscle at the back of the inguinal canal.

Thus the inguinal canal is, at its anterior part, formed by the tendon of the external oblique; on its posterior, by the tendon of the transversalis, and by its folded muscular fibres; behind which is the fascia transversalis, into which those fibres are also inserted. It contains the spermatic cord, and the internal oblique muscle.

Its lower part is bounded by the external abdominal ring, formed by the separation of the tendons of the external oblique muscle; and at its upper extremity are placed the two portions of the fascia transversalis, forming, with the tendon of the transversalis, the internal ring: the anterior, continued from the edge of Poupart's ligament to the outer side of the spermatic cord; the posterior, or internal, descending behind Poupart's ligament, to form the crural sheath, and ascending behind the spermatic cord, and tendon of the transversalis.

Between the two layers passes the spermatic cord. From the edge of the two portions of the fascia, a layer of membrane extends, in a funnel shape, uniting itself with the spermatic cord: thus the cord becomes united to each aperture through which it passes—at the external ring, by the fascia superficialis; at the upper part of the canal, by membranous processes from the fascia transversalis, which descend upon and envelope the spermatic cord.

The epigastric artery, arising from the external iliac at Poupart's ligament, curves inwards and upwards, behind the inguinal canal, to the rectus muscle, giving an artery to the cremaster in its course.

OF THE SPERMATIC CORD BELOW THE EXTERNAL RING.

The cord is covered by a superficial fascia, which is situated immediately beneath the integuments. It is loosely attached to the tendon of the external oblique muscle, and adheres strongly to the Spermatic cord, &c.

Spermatic cord described.

edges of the external abdominal ring, and unites the cord to them, so as to conceal the opening until the fascia be removed. It descends upon the outer surface of the cremaster, adhering to it by a loose texture; and externally it blends with the cellular tissue of the scrotum. The fascia descends to the lower part of the testis, still adhering to the cremaster, and surrounding it.

The use of this fascia is to give support to the testis and its coverings; and by its loose connection with it and with the cord, still permits the free motion of the testis, and its power of eluding pressure or violence.

The second covering of the cord is the cremaster muscle.

Its origin is from Poupart's ligament in the inguinal canal, between the internal oblique and transversalis muscles. It there blends with some of the fibres of both of those muscles:—below the origin of the fibres of the internal oblique, it arises from Poupart's ligament nearly to the external ring; behind the spermatic cord it receives muscular fibres from the transversalis. It is also attached, to the inner side of the abdominal ring, to the lower part of the sheath of the rectus muscle.

From these attachments it descends upon the spermatic cord in loops, as Cloquet, the excellent French anatomist, has shown.

It envelopes the vessels and nerves of the cord in its descent, and forms numerous tendons, which resemble, in their first appearance, nervous filaments. Its insertions are as follows:—

Three insertions.

First, it forms a tendinous sling, which envelopes the lower part of the tunica vaginalis.

Secondly, it sends tendinous fibres into the inferior part of the testis and epididymis, and into the tunica vaginalis.

And, thirdly, it blends with some cords which surround and enclose the lower part of the vas deferens, and which may be traced to the upper orifice of the inguinal canal, and pass down upon the spermatic vessels.

The cremaster muscle has an artery to supply it with blood, which is the *third artery* of the spermatic cord.

The *cremaster* artery arises from the epigastric, near the internal

opening of the inguinal canal. It passes inwards towards the lower part of the rectus and pyriformis muscles, nearly in the line of Poupart's ligament internally, and then divides into two branches: the first passes to the rectus and pyriformis muscles; the second descends upon the cremaster muscle, to which it gives vessels in its course. (see plate.)

The vein accompanying this artery terminates in the epigastric vein, and a branch of a nerve attends them.

The use of the cremaster muscle is to draw up the testis in coition; for it presses the testis against the pubis and abdominal ring, and thus aids the passage of the semen as it is secreted.

When examined in a full-grown fœtus, it appears that the testis has been drawn down into it, as into a purse; and if the testis has not long descended, and its adhesions to it are slight, it can be easily drawn from the cord and testis, excepting at its lower part, where it firmly adheres to the tunica vaginalis reflexa, and to the remains of the gubernaculum, epididymis, testis, and vas deferens.

The course and distribution of the blood-vessels, absorbents, and nerves of the cord, I have already described.

ON THE DESCENT OF THE TESTIS.

Descent of the testis.

As the length of the spermatic artery seems to be necessary for its elaborate secretion, and its length is increased by the serpentine course of the vessel, nature has provided that the testis should have been originally placed near the origin of its vessels, rather than the vessel should be formed through so long a space, and be from that cause in danger of imperfection; and that this is her design, is shewn by the ovaria being placed in the fœtus, nearly in the same situation as the testes in the male.

The testes, therefore, in the first seven or eight months of the fœtal existence, are found situated upon the loins. They are said to be placed immediately below the kidneys, but this is correct only as regards the fœtus in the earliest months; but they are placed upon the lower part of the psoæ muscles in a fœtus of five to six months.

Descent of the testis.

The testis is circumstanced as the other abdominal viscera, being covered by the peritoneum upon its fore-part and sides, but not posteriorly; and this portion of the peritoneum is the tunica vaginalis testis of the adult extended over the tunica albuginea.

From the lower end of the testis and epididymis the gubernaculum proceeds, behind the peritoneum, but covered with it on its fore-part and sides. It is composed of several strong ligamentous fibres, which proceed through the inguinal canal to the cellular membrane of the scrotum, in which it is lost.

The peritoneum of the lower part of the abdomen passes down upon, and adheres to the gubernaculum, so as to form a small pouch in the inguinal canal, to which the cremaster muscle is attached.

Above the testis, and behind the peritoneum, the spermatic artery passes from the aorta a little below the renal artery, and enters the posterior edge of the testis, which is not covered by the peritoneum.

The spermatic vein passes from the posterior edge of the testis behind the peritoneum—on the left side, to the emulgent vein, and on the right, to the inferior cava.

The vas deferens descends behind the peritoneum, from the lower end of the epididymis, passing posteriorly to the gubernaculum over the psoas muscle and iliac vessels, to the duct of the vesicula seminalis behind the bladder.

The bladder, and even the vesiculæ seminales, in the fœtal state, are so little buried in the pelvis, that even the latter can be brought into view without dissection.

The vas deferens is accompanied by the deferential artery, which springs from one of the vesical arteries of the hypogastric, and terminates in the epididymis and tunica vaginalis.

The cremaster muscle, as far as I can distinguish it in the fœtus, passes upon the gubernaculum to the epididymis and testis, and is attached to the process of peritoneum which descends with the testis as a pouch, to the lower part of the inguinal canal; and the testis descends into this muscle as into a purse, as it is directed down by the gubernaculum, and hence the loops which it forms.

If any one will be at the trouble to examine a fœtus at the eighth or ninth month, soon after the testis has descended, he will find that the cremaster may be readily turned from the spermatic vessels and vas deferens, so as to leave them free from it; and it can be separated from the epididymis and testis, excepting at the lower extremity of each of those bodies, and the lower end of the vas deferens, into which it is inserted, so that it forms a purse to the testis and cord, after their descent. Descent of the testis.

In animals, in whom the testis remains in the abdomen, the cremaster still exists. I do not believe that it is the cause of the ascent of the testis, nor that it is designed as a suspendor, but as a compressor of the testis.

I will merely put it as a query—if the descent of the testis may not be assisted by the pressure of the fluid, provided in the abdomen of the fœtus to allow of the growth of parts, upon the pouch of the peritoneum, which adheres to the gubernaculum, and which assists in forming the tunica vaginalis reflexa?

If the testis has not descended at birth, it is often afterwards forced down either by a congenital hydrocele, or by a hernia congenita.

The descent of the testis begins at the very earliest period of its formation; for it approaches the groin more in the fourth than the third month, more at the fifth than the fourth, and so proceeds.

It reaches the scrotum about the eighth month, but varies greatly in point of time.

The peritoneum, which is attached to the gubernaculum, and the loose peritoneum, which lines the lower part of the abdomen, descend with the testis between the eighth and ninth months; for it is to be understood that the testis is not drawn into the pouch, but the testis, pouch, and loose peritoneum of the lower part of the abdomen descend together.

The peritoneum attached to the gubernaculum becomes the tunica vaginalis reflexa of the adult. That portion of it which covered the testis in the abdomen, is the tunica vaginalis testis of man; and that

Descent of the testis.

which it draws after it from the abdomen to the testis, is the tunica vaginalis of the cord.

Very soon after the descent of the testes, the peritoneum becomes closed by the process of adhesion; and it closes first towards the abdomen, then gradually lower down, but the exact time of its being shut is uncertain. At the ninth month I have often found both open, and I have often seen one open, and the other closed.

The peritoneum becomes shut from the abdomen nearly to the testis; and thus it forms it into a bag, which is the tunica vaginalis, from which a vaporific secretion proceeds in its natural state, which becomes serous when the secretion is too abundant, producing hydrocele of the tunica vaginalis.

The time at which the testis descends, varies greatly in different persons.

They generally reach the scrotum before the birth of the infant; but it often happens that one is placed in the scrotum, and the other remains in the abdomen, or in the inguinal canal, just above the external ring, or sometimes it just emerges from the ring. It is in these situations exposed to injury and violence; and if it remain in these unnatural places, it is rather prone to disease of a malignant character.

I have many times seen the testis descending from thirteen to seventeen years, viz.: about the age of puberty, probably from some new excitement at that period; and the descent is in some cases not accomplished until the age of twenty-one.

When the testis remains in the abdomen, it makes a strong impression upon the patient's mind, as a suspicion arises that his virility is lessened or destroyed. In a case of this kind I have known the unfortunate subject of it commit suicide.

Yet the testis in this case, and in others which I have examined, was nearly of the same size as a healthy testis when deprived of its tunica vaginalis; and the seminiferous tubes were full of semen.

It often happens that when a testis remains in the inguinal canal, there are severe spasms of the cremaster, or muscles of that canal,

PLATE VIII.—ANATOMY.

Fig. 1. Shows three vasa deferentia cæca, beside the usual vas deferens.

a, the testis.

b b, the epididymis.

c c c, vas deferens.

d, e, f, the three anorimal vasa deferentia.

Fig. 2. Exhibits a wasted testis in the adult.

a, testis.

b, epididymis.

c, vas deferens.

d, vesicula seminalis.

e, right vas deferens.

f, right vesicula seminalis.

g g, prostate gland.

h, veru montanum, with its two openings—two bristles being in the one, and one in the other.

Fig 7

PLATE VIII

accompanied with violent pain, and only relieved by the hot bath and by fomentation.

The tunica vaginalis is generally closed at birth; but it often is open on one side and sometimes on both.

This opening is sometimes so small as to admit serum only to descend into it, and then a congenital hydrocele is produced.

A truss applied in infancy, by closing the canal, cures the disease; the water being absorbed when the tunica vaginalis is closed.

The opening of the tunica vaginalis is sometimes partially closed, and produces hydrocele of the spermatic cord; but it is also the result of serous cysts forming in the cord, more especially just above the testis.

The opening of the tunica vaginalis in some instances remains small until the adult age, and it then becomes suddenly dilated by a protrusion of intestine, producing hernia congenita; and when the surgeon in the operation discovers its nature, the patient assures him he never had hernia until a few days before. This I have several times known. (See Plate.)

More frequently the tunica vaginalis, when unclosed, admits protrusion of the intestine in childhood, in contact with the testis, producing hernia congenita.

In those cases in which the testicle has not descended at birth, it often happens that a hernia becomes the means of its descent; and such hernia should remain without a truss being applied, until it has brought down the testis into the scrotum. A testis late in its descent, and produced by hernia, is often lessened in its bulk; but the testis on the other side, with this diminished organ, is sufficient for the procreation of children.

The tunica vaginalis is sometimes closed by a film of adhesion; which, becoming elongated by intestinal protrusion, forms a sac, in the mouth of which the intestine has been strangulated; and the patient dies, if unrelieved by an operation.

OF THE NERVES OF THE TESTIS AND SPERMATIC CORD, AND PARTS ADJACENT.

Nerves of the testis.

Three sets of nerves supply the testis and neighbouring parts: the first are those in the vicinity of the external ring; the second, the external spermatic nerves distributed to the cord; and the third, the spermatic plexus, which is derived from the grand sympathetic.

The first nerve is derived from a muscular branch, which may be traced to the upper part of the lumbar plexus, arising from the first and second lumbar nerves. It passes downwards over the quadratus lumborum, to ramify between the abdominal muscles, and to terminate in cutaneous nerves The principal branch of this nerve is found piercing the internal oblique, on the inner side of the spinous process of the ilium, and just over Poupart's ligament. It then runs between the internal oblique and tendon of the external oblique muscle, towards the external ring, through which it passes in conjunction with the spermatic cord; and, immediately dividing into a number of filaments, is finally distributed to the skin of the groin, the upper part of the scrotum, and root of the penis.

Sometimes, instead of one, there are two branches passing through the ring; and occasionally one nerve is formed by the junction of two or more filaments, which pierce the fibres of the internal oblique separately, and unite before they emerge with the cord.

Secondly, the external spermatic nerve is derived from the second lumbar nerve, and pierces the upper part of the psoas muscle. It then descends towards Poupart's ligament, lying on the psoas, or rather upon its fascial covering, and divides into two branches. One of these, the smaller inner, or cremasteric branch, is closely connected with, and partly covered by, the spermatic vessels, in company with which it passes through the internal ring, and immediately enters the fibres of the cremaster; here it divides into a number of filaments, most of which are distributed in that

muscle before it leaves the inguinal canal. Two long and delicate branches may, however, be traced through the external ring, descending one on the fore, the other on the back part of the cord, until they are lost in the coverings of the testicle: this nerve is distributed in the course of the cremasteric artery, at the epigastric. The second branch of the external spermatic is a cutaneous nerve, which passes under Poupart's ligament over the iliac artery, and divides into twigs, which supply the skin at the groin, and descend upon the fore-part of the thigh. Some of these branches become sub-cutaneous at the cremastic margin, and on the fascia lata itself lower down. This nerve is larger or smaller in proportion to the size of the external cutaneous of the lumbar plexus, and sometimes supplies a considerable portion of the skin of the thigh usually allotted to the latter nerve. Nerves of the testis.

Thirdly, the spermatic plexus*, which may be considered as consisting of two portions; the one descending with the spermatic vessels, the other coming from the interior of the pelvis, in close connection with the artery of the vas deferens. They meet at the internal ring.

The *first portion* is derived from branches of the superior mesenteric, renal, and aortic plexus. Three or four branches pass down from the nerves which surround the root of the superior mesenteric artery, some of which become attached to the spermatic artery where it arises from the aorta, while others join two or three small ganglia on the inferior cava, and which receive several filaments from the aortic plexus.

From these ganglia small twigs are given off, which also become connected with the spermatic artery; and when the latter has passed over the cava, and joined the spermatic vein, two or three considerable branches are received from the renal or emulgent plexus. The plexus thus formed, receiving two or three filaments from the aortic plexus, ascends with the spermatic artery, closely

* This description is of the nerve at the right side.

Nerves of the testis.

adhering to, and interlaced with, the vessels of the spermatic cord, and with them descending to the testis.

The *second portion* of nerves going to the cord is derived from the hypogastric plexus, which sends some branches of nerves ascending with the deferential artery, and entering the cord at the internal ring, adhering in their course to the peritoneum of the side of the bladder and at the internal ring. The nerves then descend in the inguinal canal, and below the abdominal ring, on the coat of the vessels with which they are united, and almost incorporated.

In tracing the nerves of the spermatic cord and testis below the ring, it is very difficult to distinguish them from the numerous tendons of the cremaster muscle, and from some cords which accompany the vas deferens and spermatic artery.

If the peritoneum at the internal ring be examined, it will be found firmly united by tendinous cords to the fascia transversalis. These cords, descending with the vas deferens, form a sheath to it, and, passing from one convolution to the other, preserve it in its convoluted state, and terminate in being fixed in the cauda epididymis, and lower extremity of the testis, blending there with the cremaster. In the same manner, cords pass down with the spermatic artery, and form a sheath, by which it is enveloped, to preserve its convolutions.

It is only necessary to dissect closely on the coats of the vas deferens and spermatic artery, to at once discover these cords, especially below the external ring.

The testis in youth is capable of being injected. At two years the vas deferens, epididymis, vasa efferentia, and rete exist; but the tubuli are imperfect, or are too small to receive injection.

In advanced age the testis becomes reduced and relaxed, from the diminished size of the seminiferous tubes, and from the smaller quantity of fluid which they contain.

It is common, in advanced age, to find the corpus epididymis

diseased; several of the lobes of the vasa efferentia being converted into a yellowish brown solid structure.

In age the seminiferous tubes become small; they appear yellow instead of red, from their having less arterial blood; and it often happens that a considerable number of them become cords instead of tubes, assuming a ligamentous appearance. A varicose state of the less testis is frequent in age. Seminiferous tubes.

The testis does not in general become absorbed, if it be partially diseased, although its functions may be interrupted, even to complete obstruction of semen.

In 1823, I made the following experiment on a dog. I divided the vas deferens upon one side, and the spermatic artery and vein on the other. Experiments.

The testis upon that side on which the artery and vein were divided, gangrened, and sloughed away.

The testis on the side upon which the duct was divided, became somewhat larger than natural. I kept the dog for six years; during that time he was twice seen *in coitu*, but the female did not produce. This was in 1827.

In 1829, I killed him, and found the vas deferens below the division excessively enlarged and full of semen, and entirely stopped, with some separation of its extremities; but it was open from the place of division to the urethra. (see Plate.)

The testis sometimes becomes wasted, of which I have given a Plate; and in confirmation of Mr. Hunter's opinion of the use of the vesicula seminalis, the vesicula on that side was certainly as large as on the other. (see Plate.)

The wasting of one testis at an early period does not prevent the person in after-life having children.

Mr. H——, a gentleman in the neighbourhood of Lynn, in Norfolk, consulted me of a disease in his bladder; and upon examining him, I found his left testis absorbed, so that nothing remained but a small body not larger than a horse-bean. His testis wasted at 23 years, from absorption succeeding inflammation. He Case.

has been twice married:—by his first wife he had one child; by the second he had five children.

The loss of a testicle.

The removal of one testis does not seriously diminish the virile powers. A Gentleman had his testis removed in 1821, for an enlargement and great hardness. He recovered in three weeks. His wife, by whom he had already one child, nursed him during his confinement. In the month of March she proved pregnant, about nine weeks after the performance of the operation.

Mr. Headington, surgeon of the London Hospital, informed me that he knew a man who had lost one testis by an operation, and who had afterwards several children.

Case.

A man, whose testis had been absorbed for fourteen years, by wearing a truss for hernia congenita, has since married, and has now a child not quite a year old.

The abstraction of both.

It has twice fallen to my lot to remove the testis of persons who had already lost one.

The first operation was performed upon a man of the name of Wallis, who had one of his testes removed in 1799, by Mr. Cooper, my predecessor at Guy's Hospital.

Case.

The second operation was performed by myself in Guy's Hospital, in June 1801, for a chronic abscess in the testis. On visiting him four days after the operation, he informed me that he had, during the last night, an emission, which appeared upon his linen; and, struck with the curiosity of this circumstance, I requested my then apprentice, Mr. Travers, to occasionally visit him after his recovery, and he had quitted the Hospital; and I have myself, during the twenty-nine years which have since elapsed, repeatedly seen him. He had been married prior to the loss of one testis.

For nearly the first twelve months, he stated that he had emissions *in coitu*, or that he had the sensations of emission. That then he had erections and coitus at distant intervals, but without the sensation of emission. After two years he had erections very rarely and very imperfectly, and they generally immediately ceased under an attempt at coitus.

Ten years after the operation, he said he had during the past year been once connected.

In 1829, he visited me, because he was a severe sufferer from piles. He then stated that for years he had seldom any erection, and then that it was imperfect; that he had no emissions from the first year of the operation; that he had for many years only a few times attempted coitus, but unsuccessfully; that he had once or twice dreams of desire, and a sensation of emission, but without the slightest appearance of it. The penis is shrivelled and wasted. He shaves once a week, and sometimes twice, his voice, naturally rather feeble, remains as at the time of the operation.

Eunuchs.

From this man's declarations, I believe that the history of eunuchs, if perfectly castrated, has been very much misrepresented; for it would seem that, after a few months, he lost all seminal emission, but that the erectile power remained for a few months more; and then, excepting at very distant periods, and but imperfectly, even that power ceased, and the penis became shrivelled and diminished.

Case.

The second case in which I removed the testis, was in a lad in Guy's Hospital, aged 16 years, who had previously the other testis extirpated. The disease each time was a scrofulous abscess, with subsequent ulceration. The lad had not reached puberty, and he was very weakly and emaciated. Five years afterwards, as I was stepping out of my carriage at a patient's door, a fat sleek-looking young person said, "How do you do, sir?" I said, "very well, but I do not know you." "Have you forgotten removing my testicle in Guy's Hospital, five years ago?" "Oh yes, I recollect you; you look very well," "Yes, but I am very unhappy;" and he immediately burst into tears. "Why, what do you lament?" "Oh sir, that I am not as other men—I often wish that I were dead." Desirous to cheer him, I said—"You are a lucky fellow, for you are saved from many evils." He shook his head, and I left him sorrowful.

In describing the different parts which compose the testis, I have mentioned the uses of each; and it was not my original intention to enter more largely into the physiology of this organ. The structure of the testis being understood, the veriest tyro will readily comprehend the course of the semen. It is secreted in the tubuli, and is conveyed into the rete; from the rete into the vasa efferentia. It next passes through the epididymis to the vas deferens, which opens, in common with the duct of the vesicula seminalis, at the veru montanum, in the prostatic part of the urethra.

LECTURE XXVI.

ON THE DISEASES OF THE TESTICLE.

That change to which the testicle is sometimes, but not very frequently subject, viz. the formation of a number of cysts or hydatids within its substance, is the disease which I shall first describe.

OF THE HYDATID OR ENCYSTED TESTICLE.

Age at which it occurs.

This change in the testicle is usually observed in the earlier periods of life, generally from eighteen to thirty-five years, although I have seen it occur at forty-nine years. It has been said to begin in an enlargement at the end of the epididymis; but of the part in which it commences I am by no means certain, whether in the testis or in the epididymis; for the enlargement is so gradual and imperceptible, that it is usually discovered by accident. The disease is generally unattended with pain, nor does the patient complain of any tenderness in the part when it is handled. It does not seem to be produced by or attended with any constitutional disease, for the appearance of the person is sometimes that of robust health. There is no redness of the scrotum, but the veins of the spermatic cord are, in some instances, very much distended

Symptoms.

PLATE IX.—MORBID ANATOMY.

Views of hydatid testis.

Fig. 1. This is a most excellent drawing of hydatid testis, as it appears immediately after its removal from the living body, shewing its excessive vascularity; its numerous cysts, containing serum or fibrine, according to the degree of increased action accompanying the disease. The epididymis is similarly diseased.

a, spermatic cord.

b b, testis and epididymis in one mass.

Fig. 2. A section of a testis less affected than the former with the same disease.

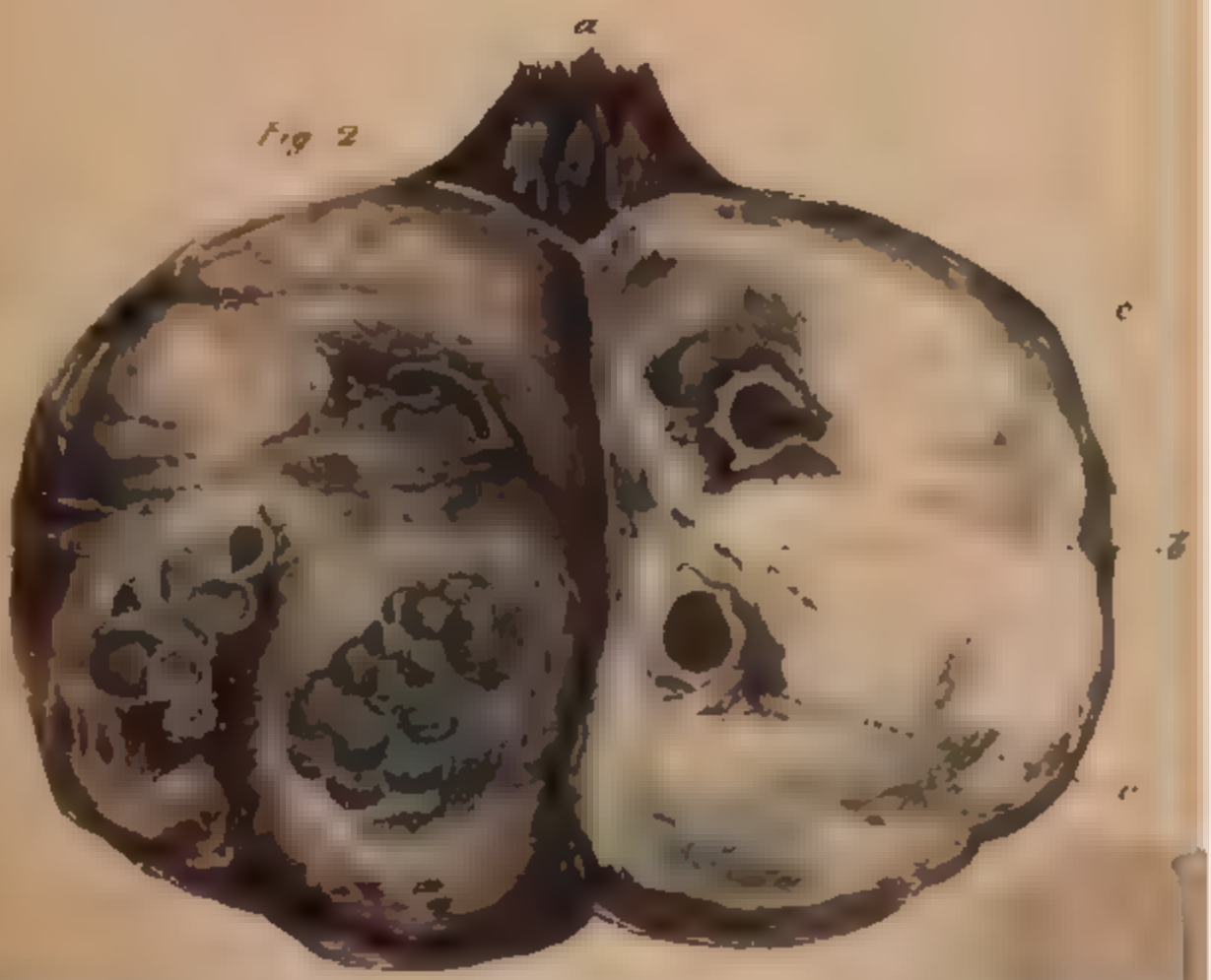
a, spermatic cord.

b, testis partially drawn.

c, hydatids.

The upper hydatid on the right side contained mucus, which is in part drawn out.

PLATE IX



with blood, so as to be varicose. The form of the swelling is that of the testicle, rounded upon its fore part, and flattened upon its sides, rather than pyriform like hydrocele. The epididymis, under the greatest enlargement, can be distinguished in its swelling from the testis by a line of separation between them. The disease is attended with obscure fluctuation, but it is rather a yielding at the part compressed with the finger, than an extensive fluctuation from one extremity of the swelling to the other. If the diseased part be firmly compressed, it gives the sensation of squeezing the testis; it gradually increases until it acquires great size, and then its weight becomes very inconvenient, and the disease produces considerable uneasiness in the loins, from the testicle stretching the nerve of the spermatic plexus. On these accounts, viz. the size it acquires, and the pain which its weight produces, the patient becomes anxious for its removal.

I have never seen this disease affect the spermatic cord to the abdomen, or extend its influence beyond the testicle and epididymis.

ON THE DISSECTION OF THIS DISEASE.

On cutting into the part after its removal, the tunica vaginalis is found to be a little thicker, and the tunica albuginea is much denser than natural. The testis in its interior, is filled with numerous cysts of various sizes, some small as the heads of pins, others of the size of peas, and the largest about an inch in diameter: as they vary in size, so the fluid which they contain differs in appearance—the smallest contain a watery fluid, transparent, and without colour; the larger appear to be filled with serum; and the largest, when opened, discharge mucus with some pus, as they have undergone a partial suppuration. I have seen in these cysts a true hydatid contained in the fluid, like that which is frequently found in the liver. The cysts are highly vascular, and their appearance is very beautiful when the serum is seen through a highly vascular cyst. The glandular structure of the testis seems to be in a great measure destroyed. The appearances in the epididymis are of a similar kind, only that the cysts do not acquire the same magnitude.

Numerous cysts.

Contain different fluids.

Cysts vascular

Mistaken for hydrocele.

This disease is often mistaken for hydrocele; and it must be confessed, that they are with great difficulty distinguished from each other. I do not believe that there is any surgeon who is candid, and who has had such opportunities as the surgeons of the large Hospitals possess of witnessing disease, who will not confess he has mistaken this disease in the testicle for hydrocele, and plunged a lancet into it, and has been surprised to find, that a little water and blood only have followed.

Marks of distinction.

The marks of distinction are a less extensive fluctuation, a much heavier swelling, rounded upon the fore part, and flattened upon the sides; the entire absence of transparency; the sensation of the testis being squeezed under pressure; the varicose state of the vessels of the cord and dilated veins of the scrotum; a division of the swelling into two, viz. testis and epididymis. Testis not felt as in hydrocele.

Case.

Charles Demby, aged forty-nine, was admitted into Guy's Hospital, 23rd of May, 1804, with enlargement of the testis. It began two years before in a diminution of the left testis, accompanied by a sense of weakness on the left side; it afterwards gradually became larger than the other; and he applied, three quarters of a year after discovering this increase, to a surgeon of the first talent and respectability in the neighbourhood of London, who introduced a trocar into the testis, and a little water was observed to issue, but the quantity was very small. He immediately pronounced it a case of hydatid testicle: as it still continued to increase, the patient applied for admission into Guy's Hospital. On the 29th of May I removed the testis, and upon cutting into it I found a purulent fluid in some of the cysts, and the appearances which I have described in others. The wound quickly healed, and he was discharged on the 16th of June, having thus early entirely recovered.

Case.

Mr. Davie, surgeon, brought me a testis from a subject in the dissecting-room, in which one of the globular hydatids was lodged. It was enclosed in a distinct cyst, produced by adhesive inflammation; the hydatid itself exactly resembled that which is so frequently met with in cysts of the liver.

Bartholomew Lupre, aged thirty, an Italian sailor, was admitted into Guy's Hospital in April, 1809, with an enlarged testis, which he reported began four or five months previously; the cause was unknown, but he supposed that it arose from a cold, produced by his wearing wet clothes; the veins of the scrotum were much loaded with blood, and those of the spermatic cord were very varicose. This man suffered considerable pain in his loins from the weight of the swelling. I performed the operation of removing the testicle, and found it, upon dissection, full of cysts of various magnitude. Case.

A young medical man called upon me with enlargement of the testis, unattended with pain: its increase was gradual, its weight was considerable, its fluctuation obscure; the general health was good. Mr. Guthrie removed the testis, which I examined, and found to be of the hydatid or encysted kind: he gradually recovered. Case.

The cause of this disease is unknown, and I shall not indulge in speculation, which would probably be unsatisfactory for want of proof, and useless in preventing the occurrence of the disease, if clearly developed. Cause

The operation for the hydatid disease is required from the inconvenience resulting from its size, and from the pain in the loins produced by its weight. A quantity of blood should be taken from the arm; the patient briskly purged for a few days, and animal food refused for a week before the operation. I have never known a patient do otherwise than well under the removal of the testicle for this disease.

You may confidently also assure your patient, that there is no remote danger of returning disease; for in no instance has there, within my knowledge, been any extension of the complaint to the abdomen by the absorbent vessels. No danger of return, if removed.

It is right to state, however, that I once saw in Mr. Moorhouse; a medical gentleman who died of a fungous testicle, which extended into the abdomen; in some parts of the testicle numerous hydatid cysts mixed with the morbid fungus or medullary structure: so it seems that the two diseases may be combined in the same individual.

OF THE MALIGNANT DISEASES OF THE TESTIS.

The testicle is subject to two diseases of a malignant character: viz. the fungous and the scirrhus disease: of which the former is by far the most frequent.

OF THE FUNGOUS, MEDULLARY, OR PULPY DISEASE OF THE TESTIS.

Under these various names has this disease been described—fungous, because when it ulcerates, a large fungous projection forms it; medullary, because it has somewhat the appearance of the brain in a putrid state; pulpy, because it is soft, and easily breaks down to pressure. It has been often also called the soft cancer, on account of some resemblance it bears to cancerous affections, although its texture is of a much softer consistence.

Symptoms.

The symptoms of this complaint are as follow: It begins in an enlargement in the body of the testicle, which is, at first, accompanied with great hardness, and the form of the swelling is more globular than that of the testis in its natural state. The epididymis becomes soon affected after the disease has shewn itself in the testis; the enlargement proceeds generally rapidly, although, in some cases it varies in that respect. The pain which attends it, is at first only occasional, and not severe. Slight causes, as a catarrh, or more than usual exertion increase its size; but by rest, the enlargement subsides nearly to its former state: it soon becomes of the size of a small orange and of its globular shape: it feels very hard, but is free from tenderness when pressed; it at length forms adhesions to the surrounding parts, so that the scrotum, after a time, is only moveable over it at some points. It is, at first, regular on its surface; after a time, the cord enlarges above the abdominal ring and at length it contracts adhesions to the pubis. At first the scrotum is not inflamed, although the vessels are somewhat larger.

Extension of the disease.

A gland or glands become enlarged in the groin, unattended with pain after the testis has adhered to the scrotum, and which gradually

PLATE X. A.—MORBID ANATOMY.

Fig. 1. An excellent specimen of fungoid disease, which has been injected, and drawn soon after its removal. It shows the great enlargement of the spermatic artery—the soft fibrine, which is effused in these cases, admitting the blood vessels very unequally—the substance easily broke down by the finger—the epididymis also affected.

a, testis.

b, spermatic cord.

c, spermatic cord and artery.

Fig. 2. The internal surface of a fungoid disease of the testis, exposed by removing the tunica albuginea, showing its tuberculated appearance.

a a, tubuli of the testis in a diseased state.

b, the epididymis.

c, the spermatic cord.

d, vas deferens enlarged.

PLATE X B

increase. An absorbent gland also generally enlarges on the opposite side to that in which the disease begins. The disease extends by absorption into the abdomen, before the testis adheres to the tunica vaginalis and scrotum, and produces a cord which may be traced upon the psoas muscle by deep pressure to the region of the kidney, where it produces, just below the emulgent artery, a tumour, readily felt by pressure, when the abdominal muscles are relaxed by bending the body in the recumbent posture.

Constitutional affection.

At first the constitution does not suffer, although the countenance of these persons is generally sallow at the very dawn of the disease, shewing that the general health is in some degree defective. There is, sometimes, uneasiness in the loins, and sharp pricking pains in the thighs and legs; and as the disease advances, the leg, thigh, and foot, on the diseased side, become œdematous, and feel weak. For some time before death the patient loses his appetite, and gets but little sleep: he has profuse perspiration; the bowels are generally very irregular, as the tumour on the abdomen increases, though prior to that time they are regular, and there is sometimes an irritability of the bladder, and frequent inclination to make water. The iliac glands are also enlarged above Poupart's ligament.

Period in which it proves destructive.

I have known the disease very rapid in its progress, terminating the patient's existence in a few months; but I have also known it two years in one case, five years in another, and fourteen in a third. The fact is, that a simple chronic disease in the testicle will remain stationary for a length of time, if the constitution be tolerably good; but if it become deranged, a malignant action is produced, and the disease assumes the character of the complaint I am describing.

The testis in this disease has often a disposition to ulcerate; the scrotum adheres to the tunica vaginalis, and assumes a livid hue. A sense of fluctuation is produced, so that it might be supposed to contain a fluid; ulceration begins in the scrotum, and through the opening a fungous substance projects, which discharges a very large quantity of a watery fluid; bleedings occasionally ensue from this fungus. If the testicle be pressed, a quantity of matter which looks like putrid brain insues; the fungus sloughs, then the part

discharges profusely, bleeds, and again sloughs, until the patient is exhausted by irritation and discharge. Towards the close of life, the pain is often excessively severe in the part, in the abdomen it is occasional only; and the patient has vomiting, and frequent attacks of diarrhœa. I have known a person just before death have the following symptoms,—vomiting, hiccough, violent pain in the abdomen, swelling of the legs and thighs, tumour in the abdomen, and pain with tenderness on pressure over the abdominal muscles.

DISSECTION.

The testicle in these cases varies in its appearance according to the stage of the disease. A secretion of soft pulpy matter, looking something like brain, is found deposited in the midst of the seminiferous tubes in its early stages; and as the disease advances, and the testicle becomes enlarged, the seminiferous tubes are absorbed, and the peculiar secretion of this disease occupies their natural situation. I have injected several of these diseases, and we have beautiful specimens of them in the collection. The secreted solid substance is very partially vascular; in some parts the vessels are very numerous, in others they do not enter the disease; those which do, are so tender in their coats, that they readily give way to very slight force; when ulcerated, the fungus is found very vascular, other parts of the tumour appear broken down, so as to have lost their organization, and resemble cream; portions of the substance are solid like brain, but in separate masses; some have often also a woolly or flocculent appearance.

The true nature of the disease.

The true history of the disease appears to consist in the part secreting, not common fibrous or adhesive matter, but a material of much softer consistence scarcely supporting vessels in some parts, whilst in others there is a rapid growth of the blood vessels: in one case, therefore, it falls readily into disorganization; in another, produces a projecting fungus so soon as ulceration allows the vessels a less limited growth; but more of this hereafter. In some parts

PLATE XI. A.—MORBID ANATOMY.

Views of fungoid disease of the testis.

Fig. 1. Shows the high vascularity of the scrotum in the advanced stages of the disease, as well as a degree of retraction of the testis and of the penis.

Fig. 2. Shows the testis of a patient of Dr. Blackman, of Ramsbury, Wilts, which Sir Astley removed.

The whole of the testis was not diseased, yet the complaint returned in the abdomen.

PLATE XI

Fig. 1

Fig. 2

we find coagulated blood mixed with the matter effused, and in others small collections of serum.

In the dissection of the body, the spermatic cord is tuberculated with fungous tumours, which contain a soft white pulpy mass; and similar swellings adhere to the peritoneum within the abdomen. A tumour is found on the loins, reaching from thence upwards, behind the intestines, to the kidney. It covers the aorta and vena cava, and the kidney adheres to it: when cut into, there issues from the tumour a considerable quantity of matter which looks like thick cream, mixed with a small quantity of the colouring parts of the blood. The mesenteric glands are enlarged; the liver has tubercles in it; the thoracic duct is sometimes obstructed by a fungus or medullary secretion on it; the duodenum passes over, adheres to the tumour, and is narrowed by it, and the aorta and cava also adhere to it posteriorly. The coats of the aorta and vena cava become diseased. Disease in the spermatic cord

OF THE DIAGNOSIS OF THIS DISEASE.

This is a difficult task. From hydrocele, the want of transparency; the more globular form of swelling; the pain which occasionally attends it; its yielding, rather than extensively fluctuating, and the appearance of want of general health, become the means of distinguishing it. Difference from hydrocele.

But from the hydatid testicle, when this disease arrives at the pulpy state, the distinction is much more difficult, and the most experienced are liable to err. Pain in the part occurring at distant intervals; a sallow complexion, and the appearance of deficient general health are the criteria, but still I have known the best surgeons mistaken. I really am decidedly of opinion, that in hydrocele, hydatid, or fungous testis, no objection exists to introducing a lancet to discover the real nature of the disease. If it be hydrocele, the rush of water directly proves its nature. If it be the hydatid swelling, a little water, mucus, and blood escape; and if medullary, blood only; sometimes a little brain-like substance appears upon From hydatid testicle.

PLATE XI

doubted if the testicle was subject to the disease to which the breast is so prone, viz. the scirrhus, which in its progress, produces cancer.

I have seen few examples of that hard swelling in the testis which resembles scirrhus, and I have never seen but one instance in which that hardened testis ulcerated and destroyed the part, resembling in its progress the cancerous ulcer of the breast. Old persons are most liable to this disease; in the few examples in which I thought the disease might be scirrhus, the age has been between fifty and seventy years.

Symptoms. The symptoms have been, a slow increase of the testicle, a hardness which rendered the part almost impenetrable to pressure, occasional severe pain in the part extending towards the loins, the disease beginning in the testis; at length extending to the epididymis; extremely slow in its progress; the surface of the testicle feeling tuberculated, irregular, knotted, and excessively hard; the spermatic cord becoming gradually thickened; the body bent forward, or the thigh advanced; the leg and thigh, upon the affected side, swollen and œdematous; some water effused into the tunica vaginalis, so that the testis is felt through an hydrocele, a tumour at last forms in the loins, but never acquires the magnitude of that in the medullary disease, nor does the testis become so large in scirrhus as in the complaint before described. The patient sinks from impaired digestion, violent pain in the abdomen, and irregular state of the bowels.

DISSECTION.

When the testicle is cut open, the tunica vaginalis and tunica albuginea are thickened; and, instead of the tubes which form the secreting structure of the testicle, a hard white mass is found, in lobes or tubercles, which are harder than the other parts, and in which cartilaginous and sometimes ossific matter are deposited. The epididymis has the same appearance, and some tubercles are found in the cord.

PLATE XI. B.—MORBID ANATOMY.

Fig. 1. Shows the progress of chimney-sweepers' cancer.

a, small wart,

b, encrusted wart.

c, ulcer with everted edges.

Fig. 2. Shows hæmatocele of long standing.

a, spermatic cord.

b, testis.

c, tunica vaginalis excessively thickened.

d d, coagulated blood in the tunica vaginalis.


Fig 1
a
b
c
Fig 2
a
d
e

SCIRRHOUS TESTIS.

Thomas Cheston, aged 44, who had resided at Tottenham, was admitted into Guy's Hospital, for an enlarged and hardened testis. The testis, when first enlarged, was impenetrably hard; water formed around it, and the hardened mass was felt through the surrounding water, which, being drawn off, was found to amount to four ounces. His disease began in June, 1808, and he says, he first observed a pain in the loins, and, a month afterwards, hardness and uneasiness in the testicle: it gradually increased, but never became very large. The testicle and epididymis, when he came to the Hospital, were both affected, but the spermatic cord was not enlarged. He had much pain in his loins, more especially in stooping. His countenance became then sallow; his digestion impaired; his leg and thigh (but first the latter) became enlarged and œdematous. He had been a strong muscular man, and thought he was in good health when the disease began. The testis was removed in March, 1809, and the wound slowly healed. He was discharged the Hospital as soon as the wound was closed; but the swelling in the thigh and leg remained, and he died a month after his return to Tottenham. Case.

On examination of the testicle, after its removal, it was found hard, white, very compact, tuberculated, and in a few spots very vascular. The epididymis was also enlarged. We have, in the collection of St. Thomas's Hospital, three or four preparations of this disease, in which the appearances of the testis are as above described. The substance is white, very hard, tuberculated, cartilaginous matter in one part; some ossific matter in others.

The disease does not increase, either in the part or in the abdomen, to the same magnitude as the fungous disease.

This disease requires the operation for its removal: but if the cord be effected, I have not known the operation to succeed; and, indeed, there is some danger to life in its performance. Disease of the cord.

In visiting the wards of Guy's Hospital, I saw a man who had a Case.

testicle very hard and considerably enlarged, and the cord at least three times its natural size. I said to the students, "It will be of no use to operate in this case, for the disease has extended beyond the reach of the knife." One of the students, who thought himself wiser than the rest of the world, told the man, if he would place himself under his care, he would take a lodging for him, and remove the part. The man consented, and this young man removed the testicle, tracing the cord, as I was informed, very much towards the abdomen. Peritoneal inflammation succeeded, and the man died in a few days, prematurely for the patient, usefully probably for the rest of life to this foolish and presumptuous student.

Constitutional treatment.

This disease will require the same constitutional treatment as that which I before described, after the operation has been performed, to prevent the return of the complaint.

LECTURE XXVII.

OF THE SIMPLE CHRONIC ENLARGEMENT OF THE TESTIS.

THIS is an extremely frequent disease, and one which has been mistaken for a malignant complaint of the part.

Commencement of the disease.

This disease begins in hardness and swelling of the epididymis, at first unattended with pain. It gradually increases, without pain, until the testicle becomes involved in the disease; the testis is quite smooth; the epididymis may be traced separately from the testis, the line of separation being more distinct than in the natural state. The patient's health appears generally but little affected, and the part is so indolent, that the patient handles it with a degree of roughness, which surprises the surgeon. Both testicles not unfrequently become affected at the same time; and sometimes, when the enlargement is subdued in the one, the other becomes diseased in a similar manner. The surface of the testicles and epididymis remain quite smooth, even under great increase of the part.

PLATE XII.—MORBID ANATOMY.

Different views of the chronic enlargement of the testis.

Fig. 1. Testis of a German gentleman who had a chronic enlargement of the testis, with scarcely any pain.

a a, testis.

b, cauda epididymis.

c, spermatic cord. The yellow and solid effusion poured out not only into the tubuli, but also in the membrane between them.

Fig. 2. Shows the granular swelling which frequently succeeds the chronic abscess. This disease is free from all malignant disposition.

a a, granular swelling.

Fig. 3. A testis removed for a granular swelling.

a, granular swelling.

b, the skin.

Fig 4. Section of a granular swelling.

a a, skin.

b b, granular swelling.

c, epididymis.

d, spermatic cord.

In the state which I have described the testicle remains for weeks, and sometimes for months; and then under severe catarrh or violent exercise, especially on horseback, it becomes very painful, with uneasiness of the loins and redness of the scrotum, which will be relieved by the means which are to be hereafter described; but soon the symptoms return, and at length a suppurative inflammation ensues, which usually happens at the extremity of the epididymis: a sinus follows, which discharges seminal fluid, stiffening the linen as semen is wont to do. From this sinus granulations spring, and produce an exuberant growth, forming a prominent granular swelling upon the scrotum. This still continues for an indefinite time, unless something be done by surgery for its relief. Its further progress.

DISSECTION.

Before this disease was understood, I have several times known the testicle removed for it, and the appearances upon dissection I have preserved in the collection.

In the adhesive stage, a uniform yellowish white adhesive matter loads the tissue of the part; the seminiferous tubes remain, but are separated by the effusion which I have described. Adhesive stage.

In the suppurative stage, upon cutting into the epididymis, and sometimes into the body of the testicle itself, a small abscess is found, containing pus, mixed with adhesive or fibrous matter; and this state of the testicle will sometimes render its removal necessary. When it forms a granular swelling, it is found, upon dissection, that a small opening is formed in the covering of the epididymis, through which the granulations spring and expand; and sometimes the testicle itself forms the granulation from the abscess which it contains, and which passes through an opening in the tunica albuginea. These abscesses will sometimes, after discharging for months and even for years, absorb the testicle, and leave the patient with little more than the tunica vaginalis and the tunica albuginea remaining; and if both testes have been affected, impotence is the result. Suppurative stage.

OF THE CAUSE OF THE SIMPLE CHRONIC DISEASE.

Morbid state of the urethra.

This complaint is often depending for its production upon a morbid state of the urethra, which produces a sympathetic influence upon the testicle. Sometimes it is simple irritation only of the urethra which produces it; sometimes a stricture in the membranous part; now and then an irritation in the prostate gland, or in the prostatic part of the urethra. But still it is wrong to view it as having merely a local origin; for there is, in most of these cases, a state of constitution which predisposes it, and without constitutional alterative means you will not succeed in curing it. I have often seen this disease follow syphilis; frequently observed it accompanied with an eruption, which many would conceive of a syphilitic character; often known it to follow a mercurial course in delicate persons, who have, during the time, been exposed to vicissitudes of temperature, and to catching cold from being frequently wet in inclement weather.

Syphilis.

OF THE TREATMENT OF THIS CHRONIC INFLAMMATION.

This complaint, for which the testicle is frequently removed, under a mistaken idea of its malignant tendency, generally yields to the treatment which I shall now advise you to adopt.

When you are consulted respecting the complaint in its adhesive stage, you will say to your patient, "Now, if you choose to be cured, there is no difficulty in effecting it; but I fear you will not submit."—"Oh," he says, "I will submit to any thing to prevent the loss of my testicle." Well, the plan then is as follows:

Position.

First, Observe the recumbent posture for a month. It is not sitting with your legs raised which will suffice, but to be absolutely recumbent is necessary.

Medicine.

Secondly, take two or three grains of submurias hydrargyri and a grain of opium night and morning, until the mouth be sore; and

PLATE XIII.—MORBID ANATOMY.

Views of chronic and scrophulous inflammation of the testis.

Fig. 1. A granular swelling following a chronic abscess in the testis, the granulations protruding through an aperture in the tunica albuginea.

a, granular swelling.

b, circle of skin at its root.

Fig. 2. Earthy matter effused in the epididymis by chronic inflammation.

a, testis.

b, epididymis.

c, cord.

d, earthy deposit.

In the state which I have described the testicle remains for weeks, and sometimes for months; and then under severe catarrh or violent exercise, especially on horseback, it becomes very painful, with uneasiness of the loins and redness of the scrotum, which will be relieved by the means which are to be hereafter described; but soon the symptoms return, and at length a suppurative inflammation ensues, which usually happens at the extremity of the epididymis: a sinus follows, which discharges seminal fluid, stiffening the linen as semen is wont to do. From this sinus granulations spring, and produce an exuberant growth, forming a prominent granular swelling upon the scrotum. This still continues for an indefinite time, unless something be done by surgery for its relief. Its further progress.

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Many testicles condemned for removal I have thus known preserved.

Sometimes requires removal.

When the disease has proceeded so far as to produce an abscess in the testicle, it will sometimes require to be removed.

Case.

One of our students, who afterwards became a surgeon in the cavalry, had an inflammation and chronic enlargement of the testicle, which had been repeatedly relieved by means similar to those which I have recommended; yet each time he returned to exertion, the inflammation and swelling were reproduced: tired by repeated disappointments, and unable to pursue his profession as he wished, he begged me to remove the part, which I did: and upon examination of it, after the operation, I found a chronic abscess in its centre.

Granular swelling.

When the abscess is followed by a large swelling, produced by an exuberant growth of granulations (a granular swelling,) the treatment which is to be pursued is to be as follows:

Treatment.

Pressure.

First. Try pressure with adhesive plasters; and if this does not succeed,

Caustic.

Secondly. Sprinkle the surface with powdered sulphate of copper, or nitrate of silver, which gradually reduces it. I once knew arsenic applied freely upon the granulations, and it destroyed life.

Removal.

Thirdly. It may be removed by excision. An elliptical incision is made into the skin on each side of the projecting granulations, and then the knife is to be carried horizontally under the root of the swelling, where it projects from the opening in the tunica albuginea; and thus it is removed. The edges of the skin are then brought together by suture, and healed.

Fourthly. But when the epididymis and testicle are much involved in the disease, and there is much loss of substance in the scrotum, it is necessary to remove the testicle.

OF THE IRRITABLE TESTIS.

Symptoms.

This disease is known by the following symptoms:—the patient has an uneasy sensation in a part of the testicle; it is tender to pressure, tender also in exercise, and unusually sensitive at all times.

PLATE XIV.—MORBID ANATOMY.

Fig. 1. Shows cartilaginous bodies growing from the caput epididymis.

a a, cartilaginous bodies.

b, cartilaginous and ossific bodies between the tunica vaginalis and tunica albuginea.

Fig. 2.

a, ossific body growing between the tunica vaginalis and tunica albuginea.

b, vas deferens.

c, spermatic cord.

Fig. 3. Hydrocele of the spermatic cord.

a, testis (*vide* p. 260.)

b, tunica vaginalis, showing where it ceases to cover the testis.

c, vas deferens.

d d, hydrocele cyst adhering to the spermatic cord.

Fig. 4. Hydatid testis dissected; and as it appears to me, showing that this disease is an altered secretion into tubes and bags formed by obstructions of the tubuli seminiferi, at least in some instances; and this is probably the reason that it does not extend further than the testis and epididymis (*vide* p. 296 and 320.)

a, spermatic cord.

b b b, numerous bags of fluid.

PLATE XIII.


Fig 1
Fig 2
Fig 3
Fig 4

The sensibility of the part becomes occasionally so much increased, that the slightest touch is exquisitely painful; pain is felt in the back and groin; the motion of the part and slight pressure of the clothes in walking produce so much pain as to almost forbid exercise, and the patient finds no comfort but by reposing continually upon a sofa, or by remaining in bed. The testicle is little swollen, and the whole of the part is not equally tender. The spermatic cord sometimes partakes of this exquisite sensibility. If the part be not supported the pain is scarcely tolerable. The patient is obliged to place himself in bed upon the opposite side to the disease, or he does not rest. He has pain in the thigh on the same side,—the testis appears full and loaded. Motion in most cases produces not only pain at the time, but additional uneasiness afterwards. The stomach is rendered extremely irritable, and vomiting is sometimes produced.

The disease frequently continues many weeks, sometimes exists for months, and with others endures for years. When the patient thinks himself much better, a little more exercise than usual renews all the symptoms.

The complaint produces, in some instances, so much distress of mind, so high a degree of bodily suffering, and so completely incapacitates the sufferer from amusement, and the pursuit of a profession or business, that he seeks relief from an operation, which I was thrice compelled by the patients to perform, rather than recommended it upon my own judgment.

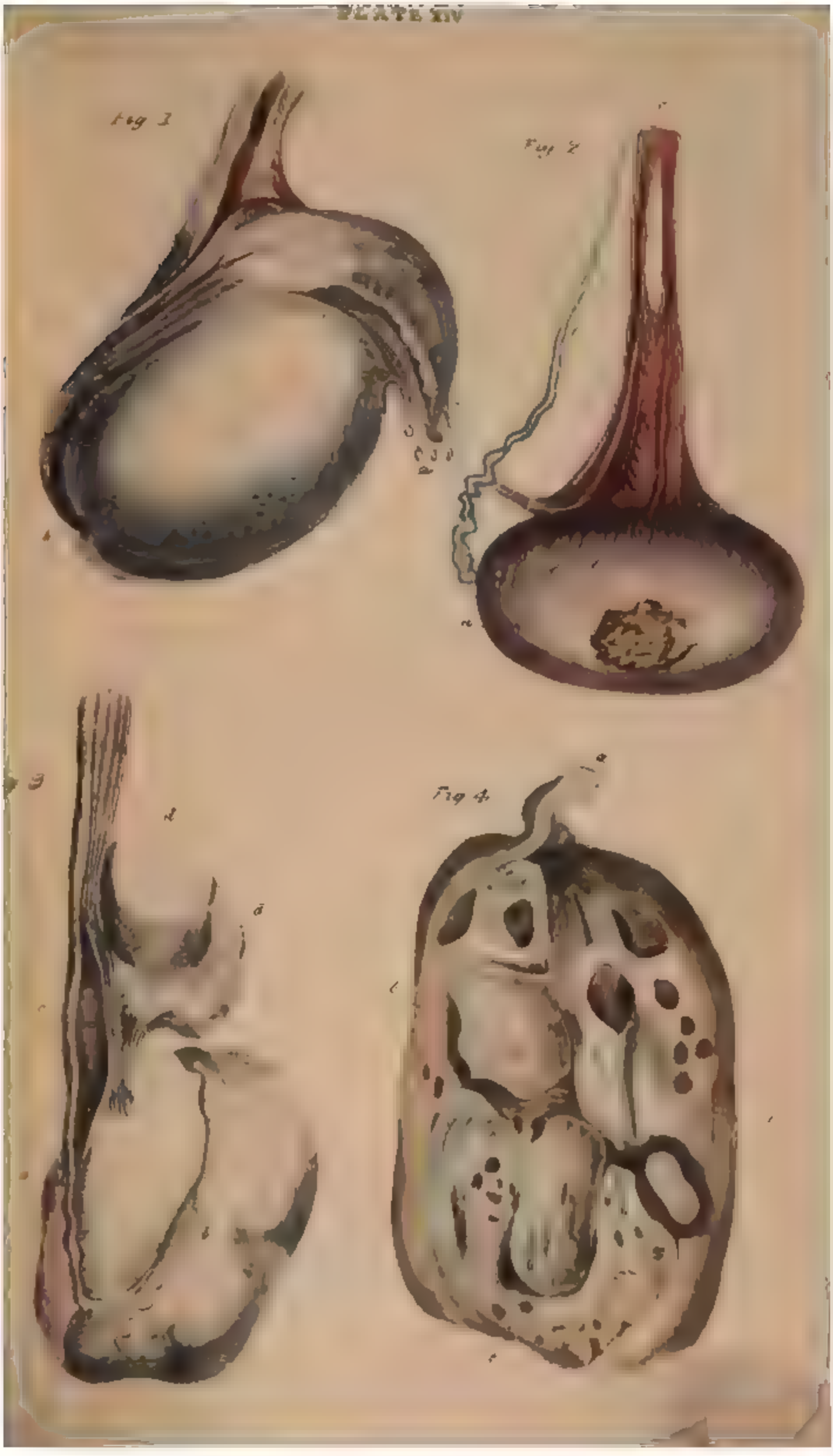
The following is a statement by a medical man of the symptoms of the disease, which rendered his life burdensome to him.

Case.

"I think I can trace back the origin of my complaint to the Spring of 1817, about eight or nine months before I married. I lived too well: got very corpulent and bloated, and had excessive venereal excitement, which I did not gratify, and felt the testicles and vessels of the cord ready to burst; but when I rose and walked, the uneasy sensations subsided.

"Soon after I married, I began to feel the uneasiness in the testicle I have since suffered from. I felt pain in coitu so great, as to lead me to go to London for advice. The testis is a little fuller:

PLATE XIV



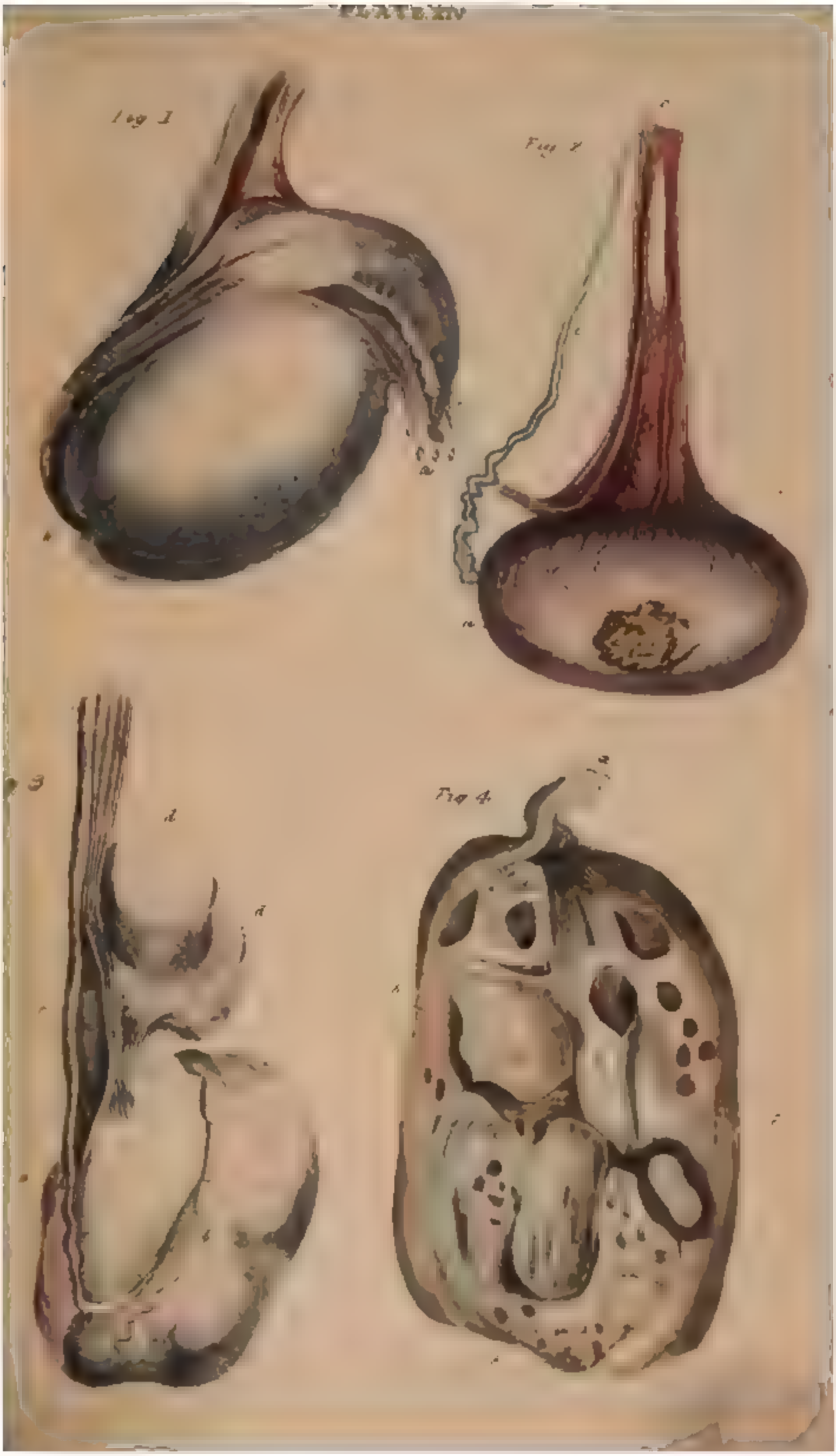


PLATE XIV
Fig 1
Fig 2
Fig 3
Fig 4

Case. Mrs. King, of Charing Cross, aged 58, had an enormous enlargement of her left breast; she discovered it fourteen years ago, and supposed it arose from a blow. When first observed, it was as large as a marble only, hard, and entirely unattended with pain.

It seemed to be buried in the breast, and was not very moveable in the glandular structure.

It gradually grew until two years ago, when it had acquired the size of a melon. At that period it seemed suddenly to grow faster than before; but was still unattended with pain, and her general health appeared to be good.

Last Christmas it also acquired a very sudden increase; but was still free from any painful sensations, excepting that sometimes, when she had a cold, she felt a slight uneasiness in the part.

On the 30th of September, 1822, I was consulted; the tumour then measured thirty-five inches in circumference, was solid, and felt cartilaginous in some parts; but in others was soft and fluctuating, and one bag evidently contained a large quantity of fluid. The solid tumour was placed above, the fluid occupied the lower part of the swelling. Her general health was good, and the swelling was free from pain; but she suffered much from its weight drawing down the skin and pectoral muscle, and putting the nerves exceedingly on the stretch.

On the following day it was removed, in the presence of Mr. Key, a surgeon of Guy's Hospital, and Mr. Laviss, a practitioner in Westminster.

The large vessels, divided in the operation, were immediately secured, or pressed upon, so as to prevent any considerable loss of blood.

The wound, when dressed on the seventh day appeared healthy; her constitution suffered but little, and she recovered without any untoward circumstance, and is now living at the same residence.

Upon inspection, the greater part of the swelling appeared like boiled udder; within which, at various parts, cysts were contained, and when these were opened, hydatids, composed of numerous lamellæ,were found: serum was effused around them.

June, 1818.—Lady Hewett, aged 60, tall, and of strong constitution, dates the origin of the swelling in her breast from a blow she received, November, 1815, in her axilla, by falling against a chair; although she had previously felt some evanescent pains in her right bosom. Nine weeks after the blow, she felt uneasiness in the right breast, which extended into the axilla. In the beginning of 1816 she discovered a swelling in her right breast, which was about the size of a nutmeg, situated below the nipple. In May, 1816, it had acquired the size of a melon, and she consulted Dr. Sharp, of Thrapston, who ordered her what medicines he thought most appropriate to her situation, and sent her to Harrowgate; but, as the swelling increased, she applied leeches every day for two months, and afterwards every other day, till September, without advantage. Case.

She then determined to try the influence of pressure, which she continued several months, by adhesive plaster, and afterwards by an instrument, contrived for the purpose, which was worn during four months, but without any advantage, as the swelling still continued to increase.

She therefore determined to leave the case to nature, and she did so until November, 1817, when the swelling began to undergo a change. It increased quickly, and became soft at its upper part, appearing inclined to suppurate:—fomentations and poultices were applied, calomel and opium given, but matter did not form. This treatment was continued until the May following, when she discontinued all the means.

In June, 1818, she made up her mind to submit to an operation, which I performed on the 10th day of June, 1818, in the presence of Mr. Cline, Mr. Lowdell, and my nephew, Mr. Bransby Cooper.

The swelling was of great size, weighing nine pounds. It was in part solid, in some parts evidently contained a fluid, and over the fluid part there was a slight blue tint. The swelling was very moveable, and reached down upon the upper part of the abdomen. Lady H.'s general health was good. The first steps of the operation consisted in making a puncture into the tumour at its most

prominent part, and discharging a quantity of serum from it, by which it was at once clear the disease was of the hydatid kind, and the magnitude of the swelling was lessened. An incision was then made across the tumour, a little above its middle, and the flap of integument being raised, the upper part of the swelling was detached from the pectoral muscle; and with the handle of the knife the swelling was further separated, and a flap of skin being left below to meet that at the upper part, the operation was thus concluded. The removal was borne with great fortitude. Two arteries, of considerable size, required to be secured. The integuments were brought together by a single suture, and by adhesive plaster. On the 16th of June the wound was first dressed, and on the 30th Lady H. was quite well.

Case. The wife of Dr. W., aged 45, twenty-six years ago, fell in getting into a carriage, and received a blow upon the breast, which immediately became black and uneasy; she applied leeches upon it, but a small lump remained. Three years ago the swelling began to increase, and, from a rounded form, became oblong, but was free from pain; its increase was so gradual, that little alteration was produced in twelve months. At this time the veins began to enlarge, and the skin to be discoloured; yet still it was free from pain. At the end of two years she applied to me, and I ordered leeches, which emptied the veins, but did not diminish the swelling, for it continued to increase, and several blue spots appeared upon it; but it preserved a globular form: spirituous lotions were applied upon it to check its growth by evaporation.

Two months before the operation, the tumour underwent a sudden increase, and was supposed to weigh about five pounds. She was free from pain during the whole progress of the disease; her spirits were good; her activity undiminished, and her constitution was unaffected until the last two months, when she said she felt nervous; and head-aches, which she had always experienced occasionally, increased in the progress of the disease: the original lump was for a time distinct in the tumour, but at length blended itself with the general mass.

In June, 1818, in the presence of Mr. Cline, I removed this tumour, by making two flaps, as in the last operation, and I tied the arteries, which I divided as I proceeded. Little constitutional irritation followed, and in six weeks Mrs. W. was well. The appearances in this breast were similar to those in Lady Hewett's.

Mrs. Styles, aged 28, had a tumour in the breast which had existed three years, and which was sometimes painful from changes of temperature, and sometimes from the approach of menstruation; but the pain was inconsiderable. Case.

It began in a swelling of the size of a filbert, which was hard and moveable; but it gradually became larger, until it was about two inches in diameter: her menstruation and bowels were regular, but rather inclined to costiveness; her general health was good.

My nephew, Mr. Bransby Cooper, removed this swelling before me; and when he cut into the tumour, a bladder of water was opened.

The cyst, in which the water was contained, appeared very vascular; it was then removed: the wound healed in a fortnight; but an abscess afterwards formed and discharged for six weeks, and then closed. This was, therefore, a simple cyst, formed in the cellular membrane, containing a considerable quantity of a serous secretion.

We have, in the collection at St. Thomas's Hospital, a large globular hydatid, which Mr. Cline informed me was discharged from the breast.

It appears then, as I have stated, that there are three kinds of hydatid or encysted tumours in the breast. One, in which the production is a globular hydatid, like that which is considered to be a distinct animal, and which is now and then met with in different parts of the human body; the second, a cyst composed of numerous lamellæ like the crystalline humour; and the other, a bag containing serum, and probably produced by an adhesive process shutting the communication between the cells of the cellular tissue, in which secretion proceeds.

DIAGNOSIS.

The marks of distinction in this disease are—1st, the health remaining perfect; 2ndly, the almost entire absence of pain, unless there is a suppurative tendency in the cysts, when I have known the disease painful; 3rdly, the swelling being firm, smooth, and not tender to the touch; 4thly, when a fluid forms, the fluctuation being very distinct, and a slight blue tinge being observable when it approaches the skin; 5thly, the fluid, when evacuated, having the transparency of water, with a very slight yellow tinge, and this is sometimes succeeded by a discharge of mucus.

TREATMENT OF THIS DISEASE.

When the tumour becomes of great magnitude, there is no other mode of relief but by removing it; and, although the complaint be very formidable in point of size, yet the operation is attended with very little danger; and if the arteries have become large, the only care which is required is to secure them during the operation, as they are divided.

When removed by operation, it does not return.

No remote danger exists, for I have never known this disease return after any operation in which the swelling was clearly removed; although I have (but not in the breast) when a small part of the swelling remained. But the disease does not contaminate the absorbent vessels or their glands, but is to be considered as entirely local.

When a single cyst exists, the swelling does not require removal.

Case.

A young woman was sent into Guy's Hospital, many yesrs ago, by Mr. Saumarez and Mr. Dixon, who had a tumour in her breast, which at first felt hard, and was about two and a half inches in diameter. Seeing her general health was perfectly good, I applied a plaster, and did no more: the swelling underwent but little change, and she quitted the hospital. Many months after she

PLATE XV

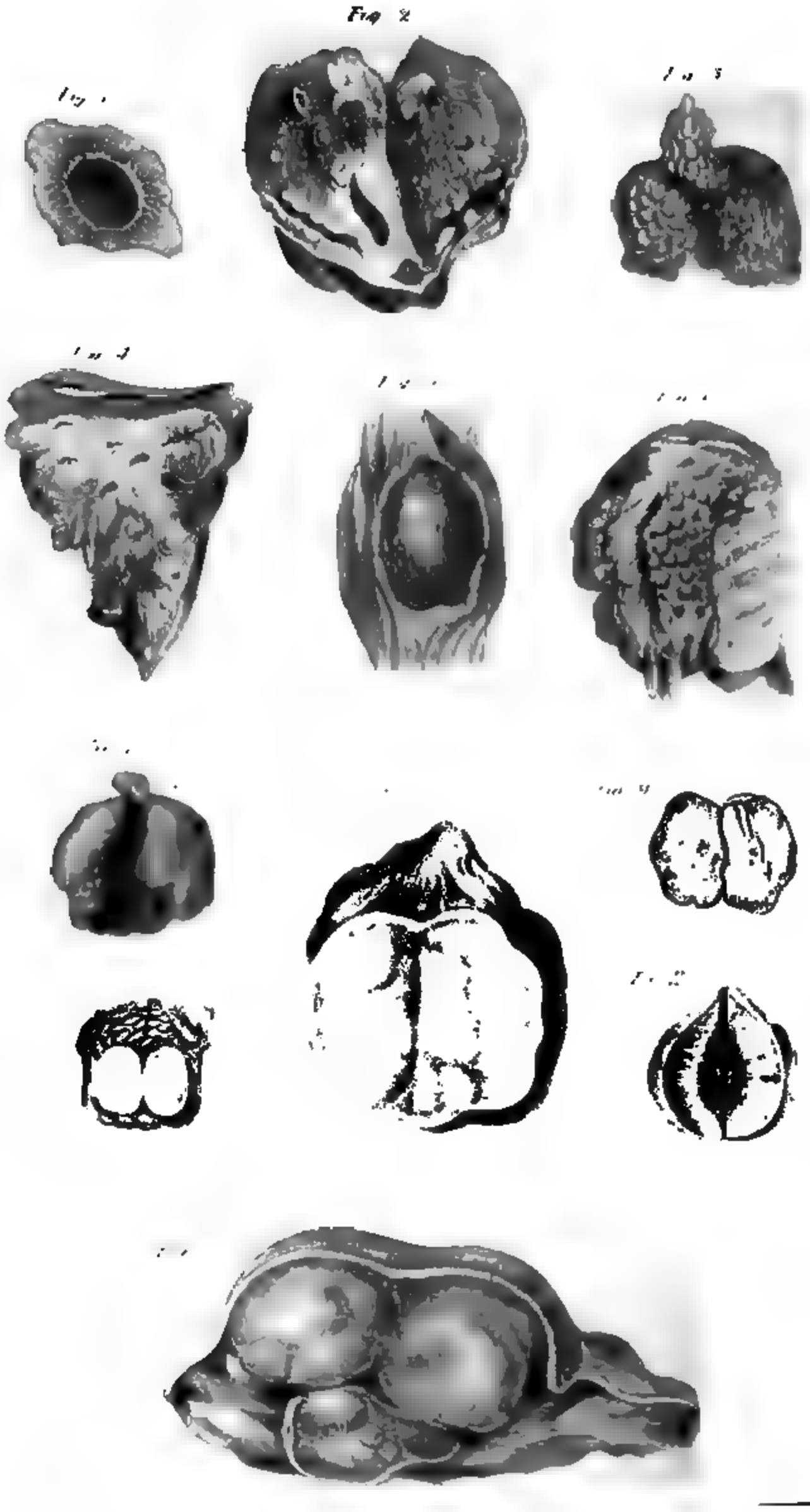


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PLATE XI

Fig. 2

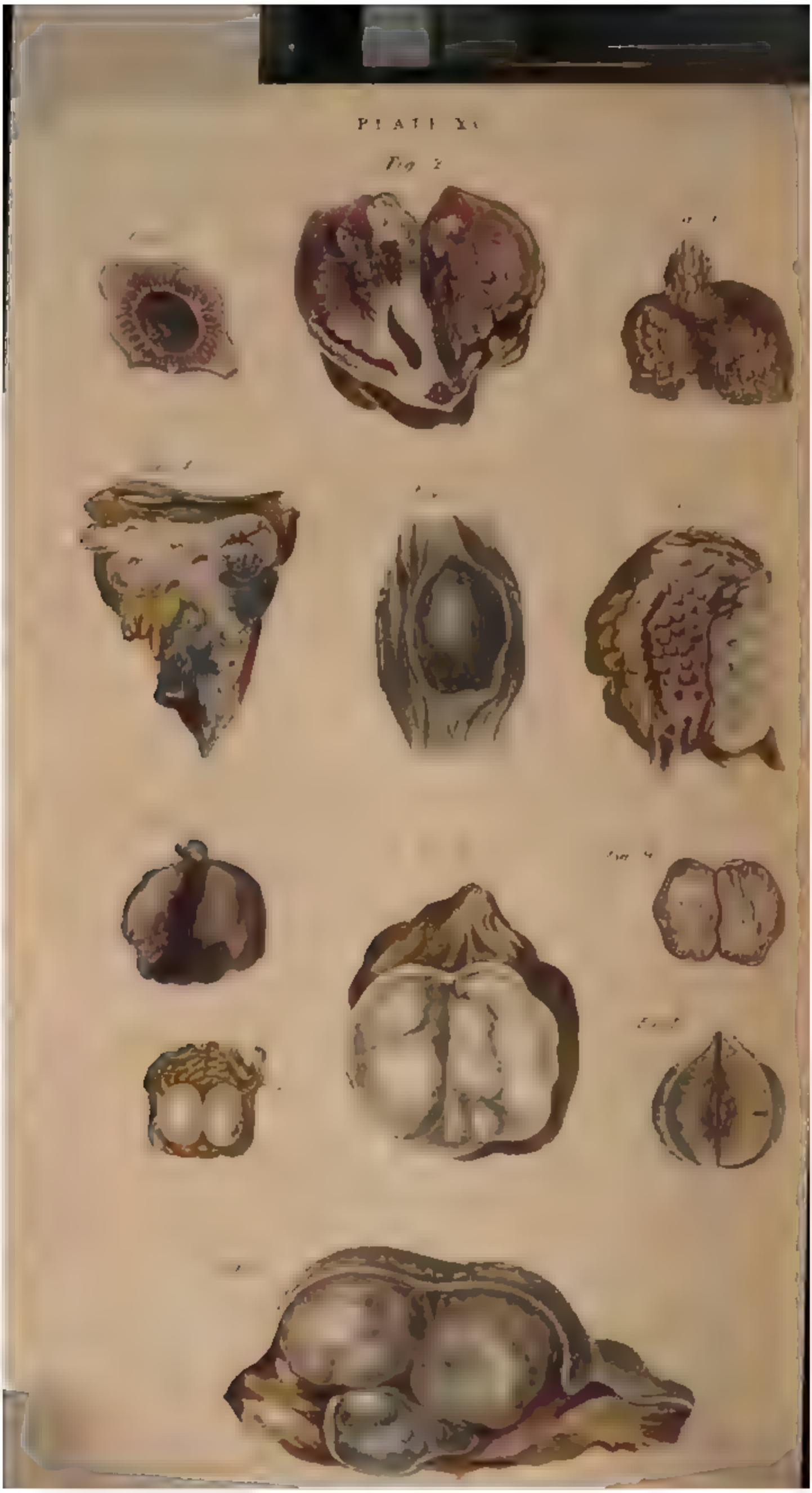

PLATE XV

Z-6

PLATE XV.—MORBID ANATOMY OF THE BREAST.

The first three figures represent the hydatid state of the breast, (*from Mrs. King's Case.*)

Fig. 1. A cyst in which the hydatids had been contained, exhibiting its great vascularity.

Fig. 2. A section of the fibrine, exhibiting its great vascularity, which also contains numerous hydatids (*vide* p. 320.)

Fig. 3. A cluster of hydatids, with the stalk upon which they grew, cut through.

The next three figures, 4, 5, and 6, exhibit the progress of the disease as it advances, combining a scirrhous structure with hydatids.

Fig. 4. Shows hydatids imbedded in scirrhous structure.

Fig. 5. View of a globular hydatid.

Fig. 6. Exhibits an immense number of small hydatids in a portion of the breast which I removed from Mrs. Hewlet, the largest not bigger than a pea.

The remaining six figures exhibit the different stages of the irritable tumour.

Fig. 7. An irritable tumour cut open, its internal surface compact and smooth.

Fig. 8. Seems to be a compound of the chronic mammary tumour with the irritable.

Fig. 9. An irritable tumour, which frequently remains stationary.

Fig. 11. Section of a scrofulous tumour of the
yellow appearance, and unequal vascular

**Fig. 12. Cartilaginous and ossific tumour of the
extended over it: two large portions
breast, below the skin; and beneath the
ossific matter is deposited.**

applied again for admission, because the swelling was much increased, and I then ordered her into the operating theatre, to remove it; but upon examining it with great attention, I felt a fluctuation, and, turning to the students, I said, "I shall put a lancet into this swelling, to ascertain its contents;" which I did, and serum only was discharged. I introduced a small piece of lint into the orifice, brought on an adhesive inflammation, the sides of the cyst adhered, and the patient did well, having no return of the complaint.

ON THE SCIRRHOUS TUBERCLE.

This disease is of extremely frequent occurrence.

The symptoms with which it is accompanied are as follow:

Symptoms.

The swelling is generally discovered after it has acquired considerable magnitude, and it must have been the growth of several weeks. It is said to be discovered by accident: but if the patient distinctly traces her feelings, she will have observed some uneasy sensation, which led her to feel the part. Sometimes the attention is first attracted to the bosom by a drop of bloody serum having stained the linen opposite the nipple, it having flowed from one of the lactiferous tubes. Sometimes a distinct and sharp pricking pain leads to the discovery of the swelling.

Situation.

It feels extremely hard. It is evidently seated in the gland of the breast. It is moveable, but more so in the breast than in itself. It is usually distinctly circumscribed, so that the surgeon thinks he is able to decide upon its limits, yet it generally happens that portions of it branch out into the gland, and connect it with parts of the breast at a distance.

Sometimes not tubercular.

In some instances, it is rather a scirrhous inflammation in the breast than a distinct tumour, which hardens and swells the bosom throughout its whole extent. In this state I have seen it cross through the cellular tissue to the other breast, and gradually extend in a similar manner through it. At first the scirrhous

tubercle is not painful, but subsequently becomes so; but then the pain is occasional only, occurring at distant intervals.

Pain acute.

The pain is exessively severe, commonly as a stab in the part; sometimes a burning heat; now a pricking sensation; then a sense of tearing, as if the nerves of the breast were torn out, or the breast itself tearing off. In other cases, the pain is more obscure, like the aching of rheumatism. It generally extends to the shoulder on the same side, and often affects the nerves of the arm.

Intermittent pains.

The painful sensations in the breast recur about once in ten days or a fortnight, when the swelling begins to be painful; but more frequently, as the disease advances; and I believe there is an occasional determination of blood to the part, and that the disease increases, particularly when this painful period recurs.

More severe prior to menstruation.

Prior to menstruation, (about four days,) the breast feels fuller, heavier, and much more painful; and although, from the last-mentioned period it may have been tranquil, it scarcely ever fails to have painful sensations at the return of the menstruations; but more so just prior to it, than at the exact moment; for it is relieved as soon as the evacuation begins, and is always much lessened after its cessation.

Gradual increase of the disease.

The swelling gradually grows from the size of a marble, when it is first observed, until it acquires a magnitude of two or three inches in diameter; for it rarely happens that the true scirrhous tubercle increases to a very considerable bulk, and this circumstance is one of its criteria.

Retraction of the nipple.

The next change is a retraction of the nipple, and this occurs from the lactiferous tubes being drawn out of their course by the swelling, and consequently they draw in the nipple, in which they terminate; frequently also the nipple becomes red, inflamed, excoriated, and sometimes ulcerated.

Puckering of the skin.

A change is also produced in the appearance of the skin, it is puckered so as to resemble a cicatrix, and this arises from its adhesion to the surface of the tubercle. Frequently the follicles of the skin are filled with black sebaceous matter around the nipple, in the areola, and in the skin on the surface of the breast.

The cellular membrane becomes inflamed and hardened, and little tubercles form in the absorbent vessels under the integuments. Absorbents become affected.

At this period, or sometimes prior to it, the glands in the axilla become enlarged, and many of these are often affected. But if the disease be on the sternal side of the nipple, the gland just above the clavicle at the lower part of the neck, is felt hardened and increased; for then the irritation is extended by the absorbents through the intercostal muscles to the internal mammary absorbent vessels and glands. The glands in the axilla enlarge.

When the glands in the axilla have been many of them enlarged and obstructed, I have seen the scirrhous irritation proceed by the absorbents from the axilla to the back of the shoulder, on the scapula, and extend from thence to the glands above and behind the clavicle. Extends to the clavicular glands.

Months and sometimes years roll on, and the disease continues in its adhesive stage, and it even often destroys without further change occurring; but frequently it proceeds to a suppurative inflammation: then the skin appears of a livid redness; the pain becomes even more severe; a slight sense of fluctuation, or rather of yielding, is perceived in this part, which gradually ulcerates and discharges only a bloody serum; for true pus is not generated. Pus is attempted to be produced; but it is not formed upon the truly malignant surfaces, but only upon the surrounding parts, if they be ulcerated. I have, however, sometimes seen an approach to suppuration. Exists for years without destroying life. Becomes ulcerated.

The surface of the sore feels hard, like the original tumour, and is remarkably insensible to pressure: and you therefore will observe the patient wipe it and handle it with a degree of roughness and want of gentleness, which surprises those who are unaware of its little sensibility. The granulations which spring from the sore are imperfectly formed; in some parts rising considerably, in others scarcely any are produced: they differ from common healthy granulations in their hardness, in their insensibility and in their secretion; which is, as I have stated, generally a bloody-coloured serum. Character of the sore.

The ulcer frequently bleeds.

Bleedings from the sore are frequent; they occur spontaneously, and relieve the patient's sufferings; and the observation of this may have led to the use of leeches in the treatment of the first stages of the disease: they also arise from removing the adhering dressings, or from wiping the surface of the sore; and the flow of blood does not easily stop, as the vessels have little power of contraction; pressure, however, succeeds in checking the hæmorrhage.

Constitutional suffering.

The edges of the sore become everted, the ulceration gradually proceeds until a large ulcer is formed, and often a very deep excavation is produced, so as to expose and even ulcerate the pectoral muscle. At this period, and often before ulceration has commenced, the patient complains of rheumatic feelings in different parts of the body, but particularly in the loins and in the thighs; but I have also known other parts, as the spine, become painful: violent pain and tenderness have been felt in the sternum and ribs, and the patient describes the pain to be that of animals gnawing the parts. I attended Lady M. who, for many weeks before her death, described herself to suffer daily the pains of the rack, arising from cancerous rheumatism.

Case.

The appearances produced by this disease in the bones, I shall presently describe.

Great dyspnœa is also attendant upon this complaint, and the patient cannot lie down in bed, or can only rest upon the diseased side; she is also frequently teazed with a cough, unattended by expectoration.

Frequently violent spasms are felt, which are referred to the region of the stomach, and they are often attended with vomiting; but, I believe, they arise from a tuberculated state of the liver. The complexion is sallow, with now and then a slight flush upon the cheek.

Extension of the disease.

After some time the arm, upon the diseased side, begins to swell above the elbow, then the fore arm enlarges; at length the swelling extends to the axilla. Its feel is brawny; it does not pit so easily as common œdema; the swelling seems to arise from the loss of the power of absorption produced by the destruction of the texture of the

absorbent glands, and from compression upon the veins of the axilla, from glandular enlargement. The constitution becomes excessively irritated by the swelling, by the pain which attends it, and by the augmented disease in the breast, and thus gradually the patient sinks under her sufferings. Destruction of life.

OF THE DISSECTION OF PERSONS DYING WITH SCIRRHOUS TUBERCLE, OR CANCER.

The tumour in the breast is a solid mass, approaching to the firmness of cartilage, waved upon its surface, composed of fibrous matter within, and the lactiferous tubes may be seen in white lines, taking their course through it.* If macerated for a time in the same water, the scirrhous matter softens and leaves the cellular texture, in which it has been deposited, with its fibres thickened and unnaturally strong. Processes extend from the swelling into the surrounding parts of the breast, which must be carefully felt for in the living subject, if an operation be performed. The blood-vessels at the edge of the tumour are more numerous than its substance, unless it be ulcerated, and then around the ulcerated part a great many are seen. Morbid appearances in the breast itself.

It seldom happens, when a tumour of this kind exists in the breast, that only one is found, for there are generally several smaller in different parts of the glandular structure. The skin often adheres to the surface of the swelling, and the absorbent vessels of the skin have frequently little tubercles in their coats.

If the swelling adheres to the pectoral muscle, scirrhous matter is deposited in the direction of its fibres, and it is converted into a hard and white substance; the glands in the axilla are changed in their internal appearance from the deposit of a scirrhous secretion resembling that in the breast, but more vascular and more quickly ulcerating, and then they become spongy. The glands above the Of the glands.

* It sometimes happens, that earthy matter is secreted into the lactiferous tubes within the swelling; but this is by no means a constant appearance.

clavicle are in the same state; and those on the left side, when enlarged, press upon the end of the thoracic duct, and disturb its functions, producing excessive pain for some time after taking food.

The glands behind the cartilage of the ribs, when the disease is placed upon the sternal side of the nipple, are generally diseased. It often happens that the axillary glands upon the opposite side to the diseased breast are also enlarged and hardened.

Of the lungs. When the chest is opened, the lung on the diseased side, and sometimes on both sides, is inflamed, and partially adheres to the pleura costalis. Serum is found in the cavity of the pleura, on the diseased side, from which I have known death produced in a few days, after an operation of removing a scirrhous tubercle. When the finger is passed over the internal surface of the pleura costalis, little scirrhous tubercles are felt upon it, and the pleura on the surface of the lungs has similar, but larger, scirrhous swellings.

Of the liver. The liver has frequently scirrhous tubercles on it, more especially when the disease in the breast is seated on the right side.

Of the uterus. The uterus is rarely free from disease; one, or sometimes several scirrhous tubercles are formed in it, and this produces the pain in the loins, of which the patient so frequently complains.

Of the ovaria. I have also seen the ovaria enlarged, hardened, and tuberculated.

Of the bones. The bones have frequently scirrhous deposits on the cancellated structure.

We have the sternum, taken from Mrs. Edge, preserved in the collection at St. Thomas's, with scirrhous secretion in it. We have the thigh bone of the same lady, which broke merely in her rising from bed. We have a fractured thigh bone in the collection, taken from another patient, which broke by her turning in bed.

We have also two most curious specimens of diseased spine, in which much of the bone has become absorbed, and scirrhous tubercles deposited in the spaces left by absorption.

Age at which this disease appears. With respect to the age at which the disease appears, I have frequently seen it at all periods between thirty and seventy years. I do not recollect more than two cases, in which the nature of the tumour was decidedly scirrhous, under thirty years. I have seen

one case at ninety-three years, another case at eighty-six, and have removed one at seventy-three, ulcerated, and the patient did well. It most frequently occurs about fifty years of age. In ninety-seven cases, which I remarked, twelve were of that age.

The tumours which are found in women under thirty years of age, and which are usually called scirrhous, are really only simple chronic enlargements, and are not disposed to malignant action, and do not absolutely require removal. Often confounded with chronic disease.

When the disease occurs in very old persons, it does not in general shorten life; but the patient lives as long with it as probably she would have done if such tumour had not existed, and dies of some other disease. I saw a lady at eighty-six, who consulted me upon the propriety of an operation for this disease, and whom I advised not to submit to it; and, after several years, she died of another complaint. Does not always shorten life.

The disease is supposed to occur more particularly at the cessation of menstruation, and which is really the fact, for it is frequently sympathetic with the uterus; but still the exceptions to this rule are very frequent. The symptoms are augmented by the approach of menstruation, and decline as the period is passing. The disease occurs more frequently in unmarried women than in others, and in women who, being married, have had no children, probably because the breast has not undergone that change for which nature had designed it, in being the fountain of nourishment to offspring; but yet pregnancy and nursing do not prevent the tendency to disease in some persons; for I have known a woman die of the complaint who had been pregnant seventeen times, and had ten living children. Occurring at the cessation of menstruation. More frequent in unmarried women.

If a tumour exists in the breast previous to the cessation of menstruation, a malignant action will occur in it at the period of its cessation, or soon after it.

There are sometimes several persons in the same family who will be affected with this disease. A physician had three relatives, sisters, the first of whom had a scirrhous tubercle of the breast, of which she died. A second had the disease, which was removed by Many persons in a family affected.

Mr. Lucas, sen.; the disease returned, and she died. The third has applied to me, from a very painful swelling in the breast: they were unmarried. Therefore, in a family in which one is affected, the first dawn of complaint should be carefully watched, and the general health be well attended to in others.

Progress of the disease slow.

The progress of this disease to its termination is always slow; but in some more so than in others; and it is well that patients, who must fall victims to the disease, should know that it often remains stationary, and that I have seen it in one instance seventeen years; one twenty-two years; in the last case the thigh bone was broken by a very slight accident; and, after several months, appeared to be united, and then again became broken, in an effort to remove her from bed. As I was examining the thigh bone, I observed her breast ulcerated, and asked her how long the disease had existed, and she said twenty-two years. The breast on the left side was absorbed, and a scirrhous swelling, with some enlargement, existed over a large portion of the skin, covering the pectoral muscle. Dr. Babington informed me, that he knew a lady, who had symptoms of the disease twenty-four years.

Cause of scirrhus.

The cause of this disease is supposed to be some accidental blow, or the pressure of a part of the dress; but although a blow may produce a swelling on the bosom, yet that swelling will not be of a scirrhous nature, unless some defective state of the constitution disposes to malignant action. If the constitution be good, the effects of a blow are speedily dissipated; but if the constitution be faulty, the swelling grows into a formidable disease. The complaint is, in part, constitutional, in part local. It is constitutional in so far as the disposition to malignant action is produced by the state of the habit. It is local also, because the action in the part is peculiar, and the result is a specific effusion different to that of common inflammation. A wound, therefore, made into the parts will produce, on scirrhous disease, a cancerous ulcer; but a wound made in removing the swelling, heals like one in any other part of the body. So with respect to the constitution, unless it be changed by a medical treatment, the disease will return as the disposition to malignant action which continues will reproduce it.

Anxiety of mind, tending to the presence of slow fever and suppressed secretions, are the predisposing causes of the complaint. A mother watching with anxiety a near and dear relative in sickness; deprived of her natural rest, and inattentive to the deviation from health in her own person, is often afterwards affected with this disease. A person, the prey of disappointment from reduced circumstances, and struggling against poverty, when her prospects begin to brighten, finds a malignant tumour in her breast; costive state of bowels, a dry skin, a paucity of other secretions have attended this anxious state of mind, and laid the foundation of that destruction which awaits her. Influence of the mind in predisposing to scirrhus.

DISSECTION.

In the examination of persons who have died from this disease, besides the affection of the neighbouring glands, scirrhous tubercles are found in many other parts of the body, but more particularly in the thoracic and abdominal viscera.

In addition to the scirrhous deposit in the sternum of Mrs. Edge (already mentioned,) scirrhous tubercles were found in the following situations: Case.

In the integument covering each breast; in the glandular structure of the breast itself, and in the neighbouring absorbent glands; also in the substance of the pectoral and intercostal muscles.

Thorax—On the pleura of each side, and on the pericardium, the cavities of which contained water; also in the substance of each lung.

Abdomen—In the liver, pancreas, mesenteric glands, and uterus.

In the dissection of another patient, who died with an ulcerated cancer on the right breast, scirrhous tubercles had formed in the direction of the internal mammary artery on each side, but more particularly on the right; also in the intercostal muscles. The surface of each pleura, and the substance of each lung, exhibited numerous similar tumours. The bronchial glands were also enlarged from the same cause. Case.

Three species of scirrhus.

There seem to be three species of scirrhous inflammation.

First, That producing a tubercle, which gradually grows to the size I have described.

Secondly, That which gives origin to a number of small scirrhous tubercles in several parts of the breast, affecting both breasts, and producing similar tubercles in various parts of the cellular membrane, in the lungs, and in the liver.

Thirdly, A scirrhous inflammation of the breast, which seems to involve the whole of the glandular structure, hardens the whole breast, which becomes attached firmly to the pectoral muscle, and to the skin, and often extends over to the opposite bosom.

LECTURE XXIX.

OF THE TREATMENT OF SCIRRHOUS TUBERCLE.

No specific remedy having been yet discovered for this disease, all that the surgeon can do is, to employ the constitutional treatment best calculated to keep the disease in check, by lessening inflammatory action.

Constitutional remedies.

The same attention is required to the due support of the secretions, as in other complaints of an inflammatory kind; and the pill: hyd: subm; comp: in the quantity of from three to five grains at night, with compound infusion of gentian, soda, and rhubarb, form an excellent medicine in that point of view.

Steel has been recommended; but although it is useful in another form of disease of the breast, in this it often occasions a feverish heat; therefore it should not be employed unless in cases in which the uterine secretion is defective, and then the Plummer's pill and the following draught twice per diem may be beneficial:

℞. Vini ferri ʒj.
Ammoniæ carbonat: gr. vij.
Aq: menth: virid: ℥j.
Tinct: card: comp: ʒss.
M. ft. Haustus bis die sumendus.

Medicine must also be given to relieve the severity of suffering, and to subdue the agonizing pains with which the disease is often accompanied. The tincture of opium, the liquor opii sedativus, the black drop, are given in succession, as either form is losing its effect, combined with the camphor mixture, and a little of the spiritus ætheris comp: which is the best mode of administering them. A patient of mine, in Guy's Hospital, was much relieved by the stramonium, and this medicine may be given in the following form: Opiates.

℞. Ext: stramonii gr. ½.
Camp: gr. 2.
M. ft. pilula bis terve die sumenda.

Very small doses of belladonna sometimes succeed in diminishing the pain, and I have known bark also mitigate the severity of the symptoms.

As no specific has yet been discovered for this disease (for it would be infamous quackery to say, that any such remedy is known for it) medical men, instead of going over again and again trials of the same means, should endeavour to discover, amidst the numerous new articles of medicine with which chemistry has of late years furnished them, some remedy for this complaint.

When there is cough, attended with dyspnœa and pain in the side, a small quantity of blood, *viz.* six or eight ounces, should be taken from the arm, and then the blood is usually covered with an inflammatory coat.

Climate has been supposed to be likely to influence the progress of this disease; but so far as I have been able to learn, it has no favourable effect. A lady consulted me, with a scirrhous tumour in her breast, which was removed: soon afterwards her husband's mercantile affairs obliged him to go to the island of Trinidad, and the wife accompanied him. She suffered greatly from sea-sickness in her voyage, and it might have been expected that this would have produced some change of action in the constitution. From the extreme warmth of the climate, some favourable change might Effects of climate.

have been expected to have arisen; yet, in a few months, the disease returned in the breast; and, finding that it was making considerable progress, she determined to return to England. I saw her soon after her return; but the change from a warm to a cold climate had produced no more favourable change than her visit to the warm temperature of Trinidad. The glands in the axilla were enlarged; the breast was ulcerated; her lungs had become affected; her body was emaciated; and it was evident she had but a short time to live. I also lately knew an English lady visit the south of Europe, when labouring under this disease, and there she died of it.

Vegetable diet.

It is supposed that a vegetable diet, and food affording little nourishment, is conducive to recovery. There is no greater mistake. Whatever weakens leads to an increase of the disease, and to a more rapid termination of the existence. Low living renders the person irritable, quickens the pulse, and makes the constitution feel the disease more strongly. Vegetable diet has not the least beneficial influence over this complaint. Wine and fermented liquors, given so as to produce a quicker pulse, or heat of skin, are equally improper, as a feverish state is equally pernicious with the nervous irritability which low living produces. In short, diet has no specific influence, and that which has agreed best with the patient at other times is the most appropriate under this disease. Meat once per diem, and weak wine and water, as a drink at dinner, agrees best. The other meals, morning and evening, to be as usual.

Local treatment.

The local treatment of the complaint consists in subduing inflammatory action; by perspiration, by wearing oiled silk; soap cerate, or a poultice of bread and poppy water; wearing a piece of fur upon the part, or a portion of hareskin, is found to tranquillize the disease.

Leeches.

As the pain is occasionally severe, and the disease seems to grow by occasional determinations of blood, it is right at these times to apply leeches; four or six of them may be used, but it is wrong to weaken the patient by their application; and therefore great numbers of them, or a frequent repetition of their application,

is wrong. When the pain is excessively severe, it is right to apply the extract of belladonna with the soap cerate.

Cerat. saponis ℥j.
Ext. belladonna ʒj.
Ol. lavendulæ gtt. v.
M.

If there be a disposition to suppurative inflammation in the tumour, it is right to use fomentations and poultices. Poultices.

When the part is ulcerated and is granulating, the bismuth ointment is a good application; as it also is to an appearance of erysipelatous inflammation on the surrounding skin. The unguentum zinci oxydi, under similar circumstances, may be of service. Chalk and opium I have seen applied with advantage.

When the sore is excessively painful, the following powder should be rubbed upon the parts twice in the day:

Pulv. cinchonæ ℥j.
—— opii ʒj.
Misce.

If the surface of the sore manifests a disposition to slough, it is right to use a carrot poultice, or the nitric acid lotion.

When the arm swells, as it does on the diseased side towards the close of the complaint, it is necessary to apply a roller from the hand to the axilla, and to keep the arm from the side, to allow of as much freedom as possible to circulation and absorption, which are impeded in the axilla, if the arm approximates the side.

OF THE OPERATION OF REMOVING A SCIRRHOUS TUBERCLE.

Before the patient be submitted to the operation of having the disease in the breast removed, she will naturally inquire what danger it produces to life, and what prospect it affords of preventing a return. To the first of these the surgeon may confidently answer, that the danger of the operation is very slight; for, in the immense number of cases in which I have performed it, I have Operation not dangerous.

lost but five patients: two of erysipelatous fever and inflammation; one from hydrothorax, which was found upon dissection to be connected with the exterior of the disease into the chest, affecting the lungs and pleura; one, a woman of great bulk, in whom the breast was very large; and one from great age.

To the second question the reply is made with more difficulty. A large proportion of cases return; but fewer than formerly, if the patient, immediately after recovering from the operation, undergoes an alterative course of medicine.

The only mode of relief.

It may be truly said, in the present state of our knowledge, the operation furnishes the only hope of preventing the disease from proving destructive, with the exception of very advanced age, in which it makes little inroad on the constitution, and little progress in the parts.

Although the patient may not ultimately survive, yet it may be said, that in cases in which the disease does return, the patient is generally preserved from a most painful and offensive state by the operation preventing ulceration.

On these accounts, I recommend the patient to submit to it. Hope is revived, and the only chance for life is given.

Parts to be removed.

If the nipple be drawn in, it should be removed with the tumour: if any cords or roots can be felt proceeding from it, they ought to be removed; and if the skin adheres to the tumour, or be in the least inflamed on its surface, it ought to be removed.

It is not sufficient to remove the tumour, but the gland from the nipple to the tumour must be removed; and the surrounding parts, to some extent, must be taken away: for the disease does not consist in the tubercle only, but there are roots proceeding from it into the lobes of the breast in its vicinity. It will be sometimes necessary to remove the whole breast, where much is apparently contaminated; for there is more generally diseased than is perceived, and it is best not to leave any small portions of it, as tubercles reappear in them.

Mode of operating.

The operation consists in making two semicircular incisions, nearly perpendicularly, which meet at their points; one on the

axillary side of the swelling, and the other on the sternal: the portion of skin over the disease should be removed. Each incision should reach the pectoralis muscle, which should be distinctly seen, and clearly exposed in the operation. As the arteries are divided, an assistant should apply his finger upon them, until the whole of the parts to be extirpated have been removed.

Removal of axillary glands.

If a gland in the axilla be enlarged, it should be removed, and with it all the intervening cellular substance, as the absorbent vessels between the swelling and the gland are contaminated; for it is wrong, after removing a swelling from the breast, to make a separate incision to extirpate a gland; but it should be an extension of the first incision from the tumour to the gland.

If several glands in the axilla be enlarged, their removal does not succeed in preventing the return of the disease; some being still seated beyond the reach of the knife. I once saw the axillary vein opened in the operation of removing several of these glands; the gush of blood was considerable, but it was evidently of the venous character; and a dossil of lint, placed in the axilla, stopped the hæmorrhage, and the bleeding did not return.

Vessels carefully secured.

So soon as the operation is performed, the divided vessels are to be secured. From faintness and sickness the bleeding stops; but, as soon as action and warmth return, the vessels again bleed. It is therefore necessary to put a ligature upon each artery, for nothing is more annoying to a patient, or alarming to her friends, than after-hæmorrhages: the wound is obliged to be opened; the patient becomes faint; the bleeding stops, and the vessels concealed in coagula are difficult to find. Much time, pain, fatigue, and alarm are saved the patient, by attention in securing the vessels at the conclusion of the operation.

Use of a suture.

In dressing the wound, put a suture through its centre, for it produces adaptation, and preserves it better than adhesive plaster. I used to object to a suture, but experience has shown me its utility. The emplastrum thuris compositum and emplastrum saponis p. æq. is the best which can be applied, being less apt to produce erysipelas than the common adhesive plaster.

If erysipelas arise in the surrounding skin, apply flour or starch to the surface.

Arm to be supported.

The arm should be supported in a sling. The ligatures may be drawn away in seven or eight days.

In those cases in which there is a general scirrhous inflammation of the breast, I never now perform the operation, because I never knew it succeed. In others, in which a number of tubercles form in the breast, the whole mamma must be removed.

After-treatment.

So soon as the patient has recovered from the operation, a medical alterative treatment should be pursued, to change the constitution, and prevent the disposition to a relapse into the former disease.

ON THE FUNGOUS OR MEDULLARY TUBERCLE.

Differs from scirrhous.

This disease differs in many respects from the scirrhous tubercle.

Occurs at all periods after puberty.

First, It occurs at all periods of life after the age of puberty, although still more frequently after thirty years of age than earlier. One of the worst cases I have seen of the complaint appeared at the age of twelve years, and destroyed life at sixteen. It began at the period of the evolution of the breast. It was removed by an operation when of large size: a small tubercle reappeared, and it was also subjected to operation; but the disease again grew, and destroyed life.

Difference of feel.

Secondly, this disease is not so hard as the true scirrhus, but has more the feeling of chronic inflammation at its early stages; and as it increases it becomes softer, yields to the impression of the finger, but immediately again fills as the pressure is removed. At this period the skin is of the natural colour, and it so continues whilst the tubercle is in its adhesive stage; but, after a few months, the skin becomes livid, and then a distinct fluctuation may be perceived from a fluid being found, which is contained in a cyst. The veins of the surrounding skin become extremely enlarged and varicose, and the surface assumes an inflammatory appearance, of a darker colour than common inflammation. The cyst next ulcerates; or, if opened, in either case, discharges a fluid, which has the character of bile, composed

of serum with red particles, somewhat changed in their colour: the fluid leaves a yellowish red stain upon paper, and readily coagulates, as serum does, by exposure to heat. The appearance of the fluid differs so entirely from that which is contained in the hydatid cyst, that any one acquainted with the two diseases readily distinguishes the one from the other by it.

After the cyst has been opened, a fungus sprouts forth, which occasionally bleeds profusely, but the bleeding is easily stopped by pressure; the discharge is excessive, wetting a handkerchief through in half an hour, and of a faint and most sickening odour; the edges become everted; a sloughing disposition manifests itself in some parts of the tumour, and occasionally in the whole of the swelling; and I have known the entire disease slough away. I remember, during my apprenticeship at this hospital (St Thomas's), Mr. Cline had a case in which the tumour sloughed away, and the wound healed, after which the woman was discharged from the hospital apparently cured; but I am not certain if the complaint did or did not return. In general, however, the profuse discharge, the repeated losses of blood, and the production of similar disease in other parts of the body, lead to the destruction of life. The patient falls a victim to this complaint much sooner than to the scirrhous tubercle, in the majority of cases dying in a few months from the first discovery of the disease.

Less painful.

Thirdly, This disease differs from the true scirrhus in being much less painful; in its earliest stages it is altogether free from pain; and I have known it acquire great magnitude with little diseased sensation: even in its most formidable state it is seldom very sensitive.

Glands not affected.

Fourthly, The glands in the axilla are not generally inflamed in the same manner as in true scirrhus, by irritation or absorption; for I have known a person die of the disease, without the axillary glands being affected: but in some instances they do participate in the disease. The cervical and internal mammary glands are also rarely affected.

Nipple not drawn in.

Fifthly, The nipple is not generally drawn in, nor is the skin puckered, having the appearance of cicatrix, as in true scirrhus.

Thus, this disease may be distinguished from scirrhus by a less circumscribed and more diffused inflammation; by less hardness; by the formation of a cyst; by the extreme varicose state of the veins; by the fungus which sprouts from it after ulceration; by profuse bleedings; by extensive sloughing; by less pain; by a quicker progress to destruction; by the absence of retraction of the nipple; by the want of puckering of the skin; and by the glands being less affected in the course of absorption.

Health at first unaffected.

The patient's constitution at first appears to suffer but little; but after a time, when the process of ulceration begins, she becomes sallow and emaciated; and from the frequent losses of blood has an extremely cadaverous appearance.

DISSECTION.

Adhesive stages.

The tumour, in its adhesive stage, appears lobulated like an adipose swelling; but the substance, which is effused by the inflammation, is more compact, and varies in colour; in some parts assuming the character of common adhesive matter, in others it is softer and mixed with the red particles of blood. In its next stage it forms a cyst, which contains the fluid that I have described; and from its interior it is that the fungous growth proceeds, and this has the appearance, when cut through, of soft organized matter; in some parts extremely vascular, in others of the semblance of coagulated blood; other cysts are found containing bloody serum, and a semi-fluid mass, looking like putrid brain, or sometimes like cream tinged by the colouring particles of the blood.

Cysts.

Origin.

It adheres to tendinous structures more than others in its commencement; for example, to the aponeurosis of muscles, as that of the pectoral. I have seen tumours of this kind arise from the deltoid aponeurosis, from the sheath of the femoral vessels, and from the tunica sclerotica; but still the cellular structure, in each

part of the body, may become affected by it. In the dissection then of these cases we meet with the glands in the axilla sometimes slightly enlarged; and next, tumours, in various parts of the cellular tissue, in great numbers; the lungs I have seen loaded with them: the liver is generally tuberculated, and I have seen one kidney affected. The uterus has soft tumours on its surface, and sometimes a polypus growing from its interior, which has been called by that able accoucheur and excellent man, Mr. Clarke, the cauliflower excrescence, or polypus uteri. I have known almost every internal organ affected by it, even the brain itself.

CAUSE OF THE FUNGOID DISEASE.

It is evident, in a disease which affects several different parts of the body, out of the line of absorption, that a constitutional cause must exist to produce it: yet it has also a local malignant action, so that a part shall become diseased whilst the surrounding parts still maintain their natural functions. Thus the disease is formed of a constitutional disposition to the complaint, with a local specific action. Upon removing these tumours, the surrounding surfaces generally heal rapidly, and without any malignant action being observed upon the wounded part. The incision, in removing these tumours, must, however, be extended into the healthy parts, at a considerable distance from the diseased; for if there be inflammation in the vicinity of the tumour, the malignant action will recur in it. I have known, in amputating a limb above the elbow, for this disease in the elbow joint, the skin inflamed between the elbow and shoulder, and the stump assumed the fungoid character. Carefully, therefore, avoid cutting near the diseased part, or the complaint will be certain to return.

Constitutional.

Local specific action.

The predisposition to this disease in the constitution is founded upon anxiety of mind, and on those circumstances which have a tendency to destroy the regular and natural functions of the body.

Predisposing causes.

[illegible].

Internal medicines.

As the disease is founded in a constitutional change, and is specific: [illegible] the objects in the treatment will be to [illegible] the general health, and to destroy the local and specific action. The best is to be attempted by the alterative medicines usually recommended, viz.

[illegible]

and a bitter infusion with rhubarb and soda.

But we are at present entirely unacquainted with any constitutional means, or local application, which has influence over the disease when it has once been manifested.

Pressure.

Pressure has been used to produce a slough of the fungus, and it is proper to give it a trial; but it is acting only upon the effect, and will not prevent a fatal termination, as the cause will still remain. Aluminous applications are useful in preventing the growth of the fungus, and the sulphate of iron has a good effect in the same point of view; but I know of nothing which has a specific action upon the sore.

Its removal by operation.

It is therefore necessary to remove this disease by operation; and, upon the whole, it less frequently returns than the scirrhous tubercle, if care be taken to extend the operation properly into the sound parts.

The operation presents none of those difficulties which have been described; for it has been said that the vessels are large, and that they bleed so profusely as to occasion dangerous hæmorrhage. It is true, in the swelling they are large; but the arteries of the surrounding parts are but little augmented, and I have never seen any dangerous bleeding from their division. It is certain that the veins particularly, and the arteries of the part, if cut, bleed freely; but they ought not to be divided in the operation, which should be extended beyond its limits: they bleed not only from their size, but from the difference in their structure, having little contractile power.

After the operation, as in scirrhus, the constitution will require an alterative treatment, to prevent the disposition to returning disease.

OF THE SIMPLE CHRONIC TUMOUR OF THE BREAST.

This disease is not of a malignant nature, nor does it produce any dangerous consequences. It attacks the young and the apparently healthy, seldom beginning after the age of thirty years; and usually appearing from the age of puberty to that period.

Appearance of the swelling.

The character of this swelling is as follows:—it is very superficial, growing rather upon the surface of the breast than in its interior. At first it appears like one of the mammary lobes being enlarged; and then, as if several were combined in one swelling. As it increases, it becomes in some degree lost in the substance of the breast. It has not the hardness of the scirrhous tubercle, and it is not accompanied with the loss of health of the fungoid disease. It is an extremely moveable swelling. It is generally unaccompanied with pain, either in the part, or shoulder, or arm, although I have known exceptions to this rule. It grows very slowly and gradually, and does not generally acquire a great magnitude. I removed one which had existed five years, which was not larger than a walnut; and I have seen one which, after fifteen years, still remained but a small swelling.

Sometimes acquires a large size.

In a patient sent me to Guy's Hospital, by Mr. Lukyn, of Feversham, the swelling had grown to a great magnitude, but still felt as if composed of a simple enlargement of the different lobes of the mammary gland. I have also seen one case, in Guy's Hospital, in which the disease became excessively large, and it ulcerated and destroyed life. They will be sometimes painful at the period of menstruation: there is nothing malignant in their nature, and I have never known them change their action into the scirrhous or fungous disease, although, under changes of the constitution, such an event would be possible. The absorbent glands in the axilla are unaffected.

Diagnosis.

The diagnosis of this disease consists in the youth of the patient; in the absence from pain; in the appearance of general health; in the slow growth of the swelling; in its superficial situation at first; in its extreme mobility; in its feel being that of the lobes of the breast enlarged, and therefore it is a conglomerate tumour; the glands in the axilla being free from disease.

Dissection of the tumour.

Upon dissection, the swelling is found to be composed of a number of lobes connected together by a condensed cellular tissue, and which appear as enlargements of the lobes of the mammary gland. These lobes are composed of smaller, which, by maceration, may be separated. The appearance of the disease, when cut into, is that of sweet-bread, that is, lobulated in every part, or composed of large lobes, which are divisible into smaller.

Cause.

The cause of the disease is unknown. I have heard it frequently attributed, by the patient, to the pressure of the bones in her stays, or that of some part of her dress.

Treatment.

In the treatment of this disease, little is effected by medicine. I generally order the emplast: ammon: c. hydrargyro to be applied to the part, and give hydrarg: c. cretâ with soda and rhubarb, but the disease rarely disappears. The great gratification which the patient receives in this case, is from the assurance that the complaint is not of a malignant nature.

Removal by operation.

If the disease increases, in spite of an alterative treatment, and the patient becomes anxious for its removal, there is very trifling risk from the operation, for I have frequently performed it at my own house, and the patients have returned home immediately afterwards. When, however, these swellings grow to a very large size, the vessels supplying them become extremely increased; and I remember seeing one removed from the left side, in which case the vessel that supplied the tumour was so large as to afford a gush of blood, which alarmed the surgeon, from the idea of there being some communication between the tumour and the interior of the chest. When they are small, as they usually remain, it is right to secure each vessel which continues to bleed, however slightly, or the wound will be obliged to be re-opened to secure it.

OF THE ADIPOSE TUMOUR.

In the breast a fatty swelling is sometimes formed. A Mrs. Smith, of Great Yarmouth, applied to me, with an enormous tumour in her bosom. As her general health was good, I advised its removal. It weighed fourteen pounds and ten ounces: the gland of the breast was placed before it. The preparation is in the Museum at St. Thomas's Hospital, and she recovered very quickly. The incision for its removal was thirty-two inches in circumference.

OF THE IRRITABLE TUMOUR.

Occurring in young persons

This disease generally occurs in young women from the age of fifteen to thirty; the swelling never acquires magnitude, and is distinguished from those which I have described by the following circumstances:

Diagnosis.

A lobe of the breast is slightly swollen; it is extremely tender to the touch, and, if handled, the pain sometimes continues for several hours. The uneasiness is not seated in the swelling only, but extends to the shoulder and axilla, down the arm to the elbow, and frequently to the wrist and fingers. It is very much increased prior to menstruation, is somewhat relieved during the period, and decreases after its cessation. The pain is sometimes so severe as to destroy rest; and even the weight of the breast in bed is sometimes intolerably painful.

Produces vomiting.

When the pain is most severe, the stomach sympathizes, and vomiting is produced. The skin is undiscoloured, and there is no external mark of inflammation. Sometimes only a small portion of the breast is affected; at others, the greater part of the bosom; and I have known it affect the breast on each side.

The constitution is highly irritable and sensitive, the hair of the patient is usually light, the complexion extremely delicate, and the temperament sanguineous.

Continues for a long period.

I have often known this disease continue for many months, sometimes for years; and once during twelve years.

Not malignant

It has not a malignant tendency, does not therefore produce any dangerous effect, and not only does not require an operation, but such a measure would be quite unjustifiable.

Very frequently this disease is accompanied with amenorrhœa, or with great paucity of menstruation, paleness of its colour, and frequently it is attended with profuse fluor albus.

Cause.

Its causes are irritability of constitution, generally a defect of uterine secretion, and often its immediate exciting cause is a blow.

Local treatment.

In the treatment, local irritability is to be diminished by the application of the belladonna in extract, or opium mixed with the ceratum cetacei; the extractum conii; or the recent conium in a poultice is beneficial. A plaster of soap cerate, to produce perspiration, or the application of hare skin, or some other fur, or the oiled silk applied with the same view, are found to be useful.

Leeches.

Leeches are sometimes employed when the pain is excessive, and the vessels of the breast are unusually full. If too frequently used, they produce debility, and add to the irritability of the system.

Constitutional treatment.

The constitutional treatment consists in diminishing constitutional irritability, by restoring defective secretion, in giving tone to the system, and in acting particularly on the uterine secretion.

Medicines.

The usual medicines are small doses of calomel and opium, combined with a mild aperient, but those which best agree are the mistura myrrhæ c. ferro, or the ferrum ammoniatum; under the continued use of which the disease gradually disappears. Rhubarb and soda, or these combined with columba, I have also seen very useful.

Conium, combined with rhubarb, I have known beneficial.

OF THE OSSIFIC TUMOUR OF THE BREAST.

Case.

The following is a case of this disease:—Mary Farmer, aged thirty-two, had a swelling in the breast for fourteen years, which had been painful during the latter seven.

The pain was very severe; the skin over it felt hot, and required

the constant application of evaporating lotions to keep it cool. The tumour was excessively hard, and very painful before menstruation, but greatly relieved after it.

Various applications, as poultices, fomentations, stimulating plasters, did not dispose it to suppurate; in short, all the means employed proved useless. When she consulted me, I thought, from the state of the health, the mobility of the tumour, and its peculiar feel, that it was not cancerous; but still I recommended its removal, to which she consented.

Upon examination of the swelling, after the operation, it was found to be composed in part of cartilage and in part of bone, the greater part of the former being ossified. Dissection.

OF THE LACTEAL TUMOUR.

Some time after delivery, a woman applies to a surgeon with a fluctuating tumour in the breast, of very considerable size, attended with painful distention, but without discolouration. The veins of the breast are very large. A lancet being put into the swelling, milk is discharged in large quantity, sometimes to the extent of several ounces; which, after it has stood for some time, separates a cream upon its surface. Symptoms.

The cause of this complaint is the obstruction of one of the lactiferous tubes near the nipple, or in it. Cause.

Its treatment consists in leaving the opening made by the lancet to discharge the milk which that part of the breast secretes. The swelling then gradually subsides as the milk in the breast disappears. Treatment.

I, in one case, saw great inflammation follow the opening; but still it is the only means of relief, unless when the opening be made the child be weaned, and the secretion of milk be arrested, and then the continuance of the opening will be unnecessary.

BREASTS LARGE AND PENDULOUS.

These glands sometimes grow to an enormous magnitude, about

the age of twenty years, so as to hang down upon the abdomen, not from relaxation but from real increase. I saw a case of this kind in a young woman, aged twenty-three, which began three years prior to my seeing her: tender to the touch, of a dark red colour. She was often costive, but regular in her menstruation.

Dr. Babington and myself witnessed the following case:

Case.

Miss L., aged seventeen years, of a light complexion and delicate constitution, who is naturally costive, has a remarkable enlargement of her breast. The left is twenty inches from its junction with the chest above to its lower part, and its circumference measures twenty-three inches. The nipple is flattened, the areola excessively expanded.

The breast feels as if every lobe of the mammary gland was increased to several times its usual magnitude.

Treatment.

The treatment consists in supporting the breasts in a suspensory bandage, in which each breast is received, and this is fixed over the shoulders.

The medicine best calculated to be useful is hyd: c. cretâ with rhubarb and soda.

THE MILK ABSCESS.

Treatment.

This abscess requires the same general treatment in its adhesive, suppurative, and ulcerative stages, as we have recommended for abscesses of other parts. In general I leave them to break spontaneously; but there are two exceptions to this.

First, When the constitution and patient are suffering severely and the abscess is slow to break, it is right to assist nature with the lancet.

Formation of sinuses.

And, secondly, when the abscess forms at the back of the breast very deeply, the aid of an artificial opening is required.

When they ulcerate, sinuses, difficult to heal, are sometimes produced; and the best treatment is to inject them with a solution of zinc, or a dilute sulphuric acid, and to apply it constantly over the breast by linen.

ON THE AREOLAR, OR MAMMILLARY TUMOUR.

At the age of seven years, and from that period until puberty, children are not unfrequently subject to the swelling behind the nipple, or mammilla of the breast. This swelling occupies a circle of an inch or more, involving the posterior part of the nipple. Age at which it occurs.

The child, feeling uneasiness in the part, is led to examine it with attention, and then finds a swelling, which is generally tender to the touch, and is sometimes, though not commonly, acutely sensitive. The skin over it is undiscoloured; it moves freely upon the pectoral muscle; but the nipple moves with it. I have seen it frequently both in boys and girls; but I think more frequently in the male than in the female. It generally affects only one breast; but sometimes, though rarely, it exists in both. It does not appear to accompany a scrofulous disposition, but is found in irritable young persons. The age at which it has most frequently presented itself to my observation, has been from eight to twelve years. Symptoms.

Within this period, then, a surgeon will be sometimes called upon to remedy a hard circular sensitive tumour behind the nipple and areola. Its cause I shall presently proceed to explain, when existing at this period of life.

I have never seen it productive of any serious disease. Sometimes, however, it endures for several months, if attention be not paid to the means for its removal. Not productive of serious mischief.

The best mode of treatment consists in the application of the emplastrum ammoniaci cum hydrargyro, and in giving small doses either of the hydrargyrus cum cretâ, with rhubarb or of the oxymurias hydrargyri, with bark or sarsaparilla; under the influence of which remedies, it generally becomes gradually absorbed in the space of from two to three months. It sometimes yields to evaporating lotions. Treatment.

The same part which is affected posterior to the nipple, in earlier periods of life, becomes the seat of more serious disease in after Disease in the adult.

age. For the structure, which I am presently to describe, is liable, particularly in the male, to be affected with the two malignant diseases to which the body is subject, namely, to the scirrhous affection, or to the fungous.

OF THE SCIRRHUS OF THE MAMMILLA.

Symptoms.

This disease begins with a circular swelling at the root of the nipple. It is at first free from pain, but is excessively hard, and is somewhat irregular upon its surface. It gradually increases in size, and during its growth a shooting, darting, and occasionally a lancinating pain strikes through the swelling, and to the shoulder, in the course of the mammary nerves.

Ulceration.

A slight ulceration next supervenes upon the surface of the nipple, which is succeeded by a yellowish brown incrustation. When the first incrustation is separated, it is succeeded by another, and a deeper ulceration ensues, by which process the nipple of the breast is gradually removed, and the scirrhous substance is exposed. Whilst the ulceration is proceeding in the centre, the scirrhus increases in circumference, until it occupies a considerable circle round the nipple, and as the bulk of the disease augments, the pain with which it is accompanied is likewise aggravated; yet the diseased part is only in a slight degree tender to the touch, and the patient is often seen to handle it in an unfeeling manner.

Bleeding.

The discharge from it, which had previously formed an incrustation, now increases, and becomes fluid, and the sore frequently bleeds.

Glands affected.

The glands in the axilla become enlarged and hardened, after a long continuance of the complaint. The patient's lungs become diseased, and water is effused into the cavity of the chest. I have seen several males and one or two females die of this complaint; and I have given a view of the appearance which the swelling assumes on dissection.

Removal necessary.

As this disease is beyond the control of medicine, for none that I

have ever known recommended, or seen employed, seems to have the least influence in preventing its destructive effect, its removal must necessarily be effected either by the knife, or by the application of arsenic. The former mode is vastly preferable to the latter, it is upon the whole less painful in the execution, and it is of more certain efficacy in completely removing the disease. Arsenic, on the contrary, often but partially removes the complaint: and the irritation which it excites extends the disease to the neighbouring absorbent glands. The absorption of the mineral, also, sometimes produces serious effects upon the constitution. When the disease is clearly and completely removed by the knife, the edges of the wound are brought together, and they readily unite by adhesion.

Treatment if an operation cannot be performed.

If the disease has been neglected, if extensive ulceration has ensued, and the complaint has proceeded beyond the relief which is to be derived from surgical operation, the applications which I have seen most advantageous in tranquillizing the sore, and improving its appearance, have been chalk and opium, in the proportion of an ounce of the former to a drachm of the latter; oxyde of zinc and opium in the same proportions; or oxide of bismuth with opium. These means, however, only retard the progress of the disease, rendering the descent to the grave a little more easy and a little less rapid, but they do not prevent the fatal termination of the complaint.

OF THE FUNGOUS TUMOUR OF THE MAMMILLA.

Symptoms.

Of the fungous tumour of this part I have seen three different instances, each of which existed in the male, and each was removed.

The tumours began behind the nipple, which adhered firmly to their surfaces. They were globular, and did not possess the hardness of true scirrhus, but felt at first more like simple chronic tumours, and grew less firm as they increased. They were but slightly tender when pressed, and entirely free from pain. They neither of them had ulcerated. After they had existed for several months they began to increase rapidly, and this circumstance excited

alarm in the minds of the patients, so as to lead them to make application for surgical assistance. The medicines which I advised, and the applications which I proposed, appearing to have no influence in preventing the progress of the disease, I recommended extirpation. Two of the patients recovered without any returning disease; the third, after a few months, sunk under what was believed to be hepatic disorder.

More spongy than scirrhous.

I have given a plate of the appearance of one of these tumours; it is much more spongy than the true scirrhus. The vessels which it possesses are more numerous, and their diameters larger, more especially of the veins. It not only adheres to the nipple, but it proceeds from its basis. The vessels which supply it are of considerable size, and require to be carefully secured to prevent after-hæmorrhage. In neither of the cases had it contracted adhesion to the pectoral muscle; and there was therefore no difficulty in detaching it from the surrounding parts.

ON THE SEAT OF THESE DISEASES.

Having thus described the diseases which are placed at the basis of the nipple, I shall now proceed to point out the structure in which these complaints begin; and which the plates connected with the work will very clearly explain.

Discharge of fluid from the nipple of the infant.

A child born at the full period of gestation, whether it be male or female, is found to have, issuing from its nipple, a fluid of milky appearance, which, when alcohol is poured upon it, deposits a solid, which has the appearance of coagulated albumen. This fluid the nurses are in the habit of pressing out; as they pretend that it is liable to excite inflammation if suffered to remain. Whether this be the case or not, or whether the inflammation which sometimes ensues be the result of pressure and friction which the nurses employ, I am not able to state; but inflammation does sometimes ensue, and requires fomentation for its relief.

Structure of the part.

Thirty-two years ago I first learned there was such a discharge from the nipple; and was led to examine whence it proceeded;

when, upon making a section through the middle of the nipple towards the ribs, I found a circular glandular structure, larger than a large pea, and situated directly behind the nipple. It is of a red colour, from its extreme vascularity. It contains ducts which open at the nipple; and from these may be pressed, first a milky fluid, afterwards a sebaceous matter. The nipple over it is situated in a depression, and appears red and granular in many subjects. The artery which supplies the gland is derived from the axillary; and the branches derived from, and distributed to the gland are numerous. Veins return the blood in the course of the arteries; and filaments of nerves from the axillary plexus are distributed to it.

Mode of exhibiting it.

All that is necessary to do, in order to observe this structure, is to make an incision through the centre of the nipple. In the fœtal state, between the seventh and the ninth month, this glandular substance is found, but of smaller size. At the end of the first year, it is still large and continues so during the second and the third year; and thenceforward it seems to lessen in both male and female until the seventh and eighth year. It is most conspicuous in fat subjects, as it is kept extended from the nipple by the adipose substance.

Evolution of the nipple.

About the eighth year it begins to increase, but it varies as to time in different persons; and as it grows towards the age of puberty the nipple becomes evolved from it. In the female, at the age of puberty two tumescences will appear; the one a small sphere directly surrounding the nipple; which then rather sinks into this little swelling; and the other a larger sphere which is composed of the mammary gland, or gland of the breast. Thus there is a mammillary and a mammary growth; a mammillary producing the nipple, which is gradually evolved as the breast increases; a mammary which is composed of the lacteal gland, the lactiferous tubes of which proceed through the mammillary process. In the male, the mammillary gland forms the nipple; but instead of tubes proceeding through it, ligamentous cords are seen radiating from the point of the nipple through the mammillary substance. These ligamentous cords terminate in a compact cellular texture at the

basis of the nipple; and the cells thus produced become loaded with adeps, so as to sustain and preserve the projection of the nipple.

If, then, a section be made of the nipple of the male in the adult subject through its centre, radiated ligamentous cords are found in its substance, and a strong network containing fat at its basis. In the plate this will be well seen in a section of the nipple of Coombs, lately executed for murder, whom I selected on account of his age, and because he was a healthy person. I made a section through the nipple, and then threw it into warm water to melt out the fat which it contained, and thus unloaded the strong network of cellular tissue at its basis.

The evolution of the nipple is as follows:

In both male and female infants a gland exists which is the nidus of the future nipple, over which the skin is puckered into a small projection. This glandular substance lies concealed under the skin until near the age of puberty, and then it gradually evolves, and becomes everted into the nipple of the adult. In the male, the tubes through which the milk of the infant passes become ligamentous cords in the nipple of the adult, and in the female, the similar tubes become the lactiferous ducts of the nipple. Thus it is that the nidus of the adult nipple is protected until the age of puberty.

Disease seated in this structure.

It is this structure, then, of the male and female nipple, prior to the age of puberty, at the time when evolution of the nipple is commencing,—which produces the swelling to which young people are subject, from the age of eight years to the period of puberty; for, when the action is greater than the evolution requires, a hard inflammatory swelling is produced.

It is in this structure that in future years the malignant areola or mammillary tumour forms. Here the scirrhous tubercle commences, which destroys the nipple, and ultimately extinguishes the life of the patient. It is in this structure that the fungous swelling which the plate exhibits is formed; and both of these are from the male. The female is less subject to the disease, because the mammillary substance is principally absorbed, and lactiferous tubes are formed in its stead.

LECTURE XXX.

ON URINARY CALCULI.

URINARY calculi are found in the kidney, in the ureter, in the bladder, and in the urethra. Where seated.

The calculi which are met with in the prostate gland, are not urinary; they are formed in the ducts of that gland, into which the urine does not gain access, and they generally differ from urinary calculi in their composition. Calculi in the prostate, not urinary.

OF THE RENAL, OR KIDNEY CALCULUS.

The symptoms by which the presence of a calculus in this organ is known are, 1st, pain in the loin, in the situation of the kidney, which pain extends forwards towards the navel, accompanied with a sense of numbness in the bowels, and downwards to the spinous process of the ilium. The pain is of an obtuse kind, it often produces a sympathetic effect on the stomach, and occasions vomiting. The loin is so tender, that the least pressure on it occasions great suffering to the patient. The act of stooping, when a stone exists in the kidney, produces acute pain in the loins, and is sometimes followed by a discharge of bloody urine. Symptoms. Pain in the loins, abdomen and hip.

I knew a gentleman, who, in stooping on his horse to open a gate, felt severe pain in the loins; he immediately discharged bloody urine, and afterwards felt the symptoms (hereafter to be described) of a stone passing from the kidney by the ureter. He voided this stone by the urethra, four days subsequent to the first attack of pain in the loins. Case.

The presence of a stone in the kidney is sometimes manifested by extreme irritability of the bladder.

A chemist, in the city, had frequently consulted me (when I lived there) for an irritable state of his bladder and urethra, for which I had recommended various medicines, and bougies had been Case.

passed; but he did not experience any relief from their employment. After I left the city, I was informed that he was dead; and upon inspection of his body, no disease of the bladder or urethra was found, but a large stone was discovered in the kidney.

Sometimes removed by ulceration.

Nature sometimes succeeds in removing these extraneous bodies by a process of ulceration; an opening being formed in the loins, through which a stone can be felt, by passing a probe, and by which the calculus is ultimately discharged.

Case.

A person came to consult me from the country, with two openings, one above and one below the last rib, through which three calculi had been discharged. Dr. Marcet analyzed these, and found them to be composed of the ammoniaco-magnesian phosphate.

Opening to be dilated.

If the calculus cannot readily pass, from the small size of the opening, the aperture should be dilated by sponge tent; if this fails, a bistory may be carefully used, as the artery and vein are before the stone.

A stone in the kidney, when very large, may, in some instances, be felt through the loins. Mr. Cline informed me, that a patient consulted him who had this disease, in whom he could distinctly feel the stone, by pressing firmly on the loins; the patient's general health would not at that time bear an operation, otherwise Mr. Cline would have removed the stone by incision.

Upon dissection of persons dying with calculi in the kidney, there are found—

First, Sometimes numerous small calculi, like grains of sand, in the tubuli uriniferi.

Secondly, A stone lodged in an infundibulum, or often several, occupying different infundibula.

Thirdly, A large stone in the pelvis of the kidney, connected by processes to others, seated in the infundibula.

Kidney enlarged.

The kidney is sometimes scarcely altered in its size, at others it becomes considerably enlarged. If the stone interrupts the passage of the urine to the ureter, the glandular structure of the kidney becomes absorbed, the pelvis and infundibula extremely enlarged,

and these membranous bags, with the capsule of the kidney only remain.

Sometimes ulceration of the kidney is produced; it enlarges, then wastes, and gradually becomes in a great degree absorbed; matter is discharged with the urine; high constitutional irritation succeeds, and if both kidneys be affected, the life of the patient is destroyed. Ulcerates.

TREATMENT.

The medical treatment of stone in the kidney consists in giving the liquor potassæ; the carbonate of potash, or soda; not that they dissolve the stone, but they prevent the formation of uric acid; the stone becomes encrusted with triple phosphate, which is a softer substance, and, perhaps, less irritating to the surfaces on which it rests; these medicines also deaden the sensibility of the organ itself. If much pain be felt in the loin, the daily exhibition of a purgative, occasional cupping, or the application of a blister to the loins, will be useful. If there be a suppurative discharge, an issue should be made in the lumbar region. Medical treatment. Local treatment.

OF STONE IN THE URETER.

The presence of a calculus in this tube is shown by pain being felt near the spinous process of the ilium, and in the direction of the psoas muscle, if pressure be made upon it through the abdominal muscles; the pain extends in the course of the anterior crural nerve, as the stone descends over the lumbar nerves which form it; also to the testicle, as the stone passes the spermatic plexus; and spasmodic contractions of the cremastic muscle occur, as it passes under the spermatic vessels. The patient is sick, often vomits, is covered with a cold perspiration, and is unusually pallid. Symptoms.

The pain is sometimes so severe, that a gentleman, who had several times suffered from this disease, informed me, that once, Case.

when a quarter of a mile from his house, he was seized with this pain, and fell on the ground, being unable to walk until his servants came to his assistance, and carried him home.

Pain not constant.

The pain has remissions, and the patient is flattered with the hope of the stone having passed the ureter; but, after a few minutes, it returns with equal violence, and it is only after repeated attacks that it escapes into the bladder.

Calculi in the ureter I have known destroy life in the following instances:

Case.

Mr. Cline had removed a stone from a boy in St. Thomas's Hospital, by the operation of lithotomy; the boy had recovered from the operation, when he was seized with rigors, great pain in the course of the ureter, and vomiting; a swelling formed just above the seat of the cœcum, in the right iliac region, which gradually increased, and the boy's constitution quickly gave way. On examination after his death, the pelvis of the kidney and the ureter were found distended with matter; and at the end of the ureter, near the bladder, a stone was discovered, which had prevented the escape of the urine, and of matter, into the bladder, and thus occasioned death. The preparation of the diseased parts is in the Museum at St. Thomas's Hospital.

Case.

Mr. Hallam, of Walworth, gave me a preparation of a stone, stopped in the ureter, which was taken from a patient of his, who had for a length of time discharged matter from the colon per anum; nature had formed an opening for the escape of the urine and pus, in this case, first by producing adhesion between the ureter and colon, and then by making a communication between the two by a subsequent ulcerative process.

Case.

We have another curious preparation of a stone in the ureter, surrounded by an abscess, taken from a patient who came to my house for advice. She had great pain in her loins, and tenderness in her abdomen, with so much fever as led me to suppose that she had but little time to live; I advised her to apply to a Mr. Smart, a surgeon, in my neighbourhood in the city, who sent to inform me, a few days after, that she was dead, and that he had permission to

inspect the body. Upon making an incision into the abdomen, there issued a strong urinous smell, and a watery fluid, mixed with matter. The intestines were inflamed and adherent; the bladder was small; one kidney was much enlarged, and the other unaltered; the ureter of the enlarged kidney was greatly increased in size, and full of matter, it was completely closed at the lower part by a calculus, and had given way above, so as to allow of the escape of the urine and matter into the abdomen.

A calculus may be discharged from the ureter, by ulceration, through the muscles of the abdomen.

Mr. Stone, of Mayfield, Sussex, gave me a calculus, which was discharged from a man who worked as a gardener. An abscess formed near the anterior superior spinous process of the ilium, from which this calculus and a quantity of matter were discharged. The man recovered. Case.

TREATMENT.

If the pain is very severe during the passage of the stone, the patient should be bled largely, to produce relaxation of the ureter, that it may yield to the pressure of the stone, and urine, and he should be put into the warm bath, to aid such relaxation. Opium, and the liquor potassæ should be given, to allay irritability; and the abdomen should be fomented, and gently rubbed from above downwards, in the course of the ureter, in order to assist mechanically the passage of the calculus. Bleeding. Warm bath. Medicine.

OF STONE IN THE BLADDER.

The symptoms change as soon as the stone quits the ureter and enters the bladder; the patient is relieved from the pain in the course of the ureter, in the testis, and thigh, but suffers usually in the following manner: Symptoms.

First, He experiences acute pain, particularly opposite to the frænum, but also along the course of the urethra; this varies in its Pain in the urethra and at the frænum.

degree, more according to the irritability of the patient, than the form or roughness of the calculus; the pain is sometimes slight, but generally severe, and is described by the patient as a cutting sensation; or, sometimes, as if boiling water or lead were passing through the urethra. Relief is experienced by pressing on the glans penis, and adult persons do so; children nip and draw the prepuce until the latter becomes excessively elongated; they also, under severe suffering, after passing urine, cross their legs, and press upon the organs of generation with great force.

The adult, when voiding his urine, often rests his head against the wall, bends his knees, and relaxes the muscles generally.

Pain after the discharge of urine.

The pain is felt more after discharging the urine, when the bladder contracts around the stone, than before it is voided.

Frequently the fæces pass at the same time with the urine, and a prolapsus ani is a common consequence of the excessive action of the muscles of the perineum and lower opening of the pelvis, more especially in children. I have seen the abdominal muscles thrown into the most violent spasmodic actions for some time after the discharge of the urine, in some of the worst cases of stone.

Bladder irritable.

The bladder is very irritable, is capable of retaining but little urine, and becomes diminished in size.

Sudden stop to the flow of urine.

Often, as the urine is discharging, a sudden stop to its flow is produced with violent pain, from the stone falling on the beginning of the urethra and acting as a valve; as the force of the bladder's contraction lessens, the stone recedes a little, and the urine again escapes. Patients, therefore, pass their urine best in a recumbent posture, as the stone does not then fall upon the neck of the bladder.

At first no change is produced in the appearance of the urine, which can direct the judgment; but when the disease has existed for some time, and more especially from violent exercise on horseback, or in a rough carriage, the urine becomes bloody. A person having a stone in the bladder cannot ride far on horseback, without dismounting to pass his urine; and is obliged to quit a carriage often for the same reason.

Urine becomes bloody.

Discharge of mucus.

As the disease increases, the bladder becomes more irritable,

the urine is loaded with mucus, and sometimes precipitates a white sediment, composed of flakes of adhesive matter, thrown out by the mucous membrane of the bladder, when it has become inflamed. This state is often attended with rigors, succeeded by heat, and other symptoms of intermittent fever, and matter is sometimes discharged with the urine. The mucous membrane of the bladder becomes ulcerated when a stone has existed long; the patient loses his health; is incapable of getting sufficient rest; and thus he is destroyed by the disease.

Mucous membrane ulcerates.

A person labouring under this complaint walks with excessive care; he does not raise his feet much from the ground, to prevent any shock to the body, which would create pain, and occasion spasmodic action of the bladder; he also lies down with great caution, as the sudden change of posture might alter the position of the stone, and produce irritation.

DISSECTION.

In examining persons who die with a stone in the bladder, the mucous membrane appears loaded with blood, it is thickened, and highly villous. Its muscular coat is much increased, and the capacity of the bladder lessened. Numerous sacculi are sometimes formed, the mucous membrane being forced between some of the muscular fibres, and, in these bags, stones are wholly or partially received. We have a preparation in the Museum showing this state of the bladder, with stones lodged in these sacculi.

Mucous coat.

Muscular coat.

Sacculi.

I have seen ulceration of the mucous membrane, and we have an example of stones ulcerating the basis of the prostate, and making their way into the urethra.

Ulceration of the mucous coat.

We have also another very curious specimen, in which the upper part of the bladder had contracted around the stone, whilst the lower part is in the natural state.

Bladder contracted in part.

A stone is often found with an enlarged state of the prostate

gland; and in some cases is met with in a bag, formed directly behind the prostate.

Hour-glass contraction.

We have a preparation showing an hour-glass contraction of the bladder, in which one large stone is lodged in the superior part, and several in the inferior; and another, exhibiting a stone in the bladder, with a large fungus growing from the prostate gland.

Ureters.

The ureters are dilated, the kidneys enlarged; sometimes one is enlarged and the other wasted from an ulcerative process.

Size of calculi.

The size of calculi generally varies from a drachm to two ounces; but the weight is not always proportioned to the size, but depends upon the composition of the stone.

The largest stone, which I have successfully extracted, weighed near six ounces. At the Norfolk and Norwich Hospital there is one eight ounces. Mr. Mayo, of Winchester, removed one, in fractured portions, of fifteen ounces. I have one in my possession which I extracted, but not successfully, weighing sixteen ounces. We have a model of a stone, given to the collection by Mr. Forster, which, I understand, was twenty-five ounces in weight. One in Trinity College library, at Cambridge, weighs thirty-two ounces and seven drachms. But the largest stone which has been found in the human body is that given to the College of Surgeons by Sir James Earle, this weighed forty-four ounces.

Pain not more severe from a large stone.

The severity of the symptoms is often in an inverse ratio to the size of the stone; which, when it is very large, produces less pain, because the urine dribbles away, or is voided by very slight contraction of the bladder.

Number of calculi.

The number of calculi is very various; but in the majority of cases only one is found; two or more not unfrequently exist. I have extracted nine in one case, thirty-seven in another, and the greatest number I ever extracted in the operation was one hundred and forty-two; these were from Mr. Allis, of Worcester, a patient of Mr. Carden; I have them now in my possession, many of them are about the size of marbles.

A great number of stones does not add much to the patient's

danger in the operation; for it is not the frequent introduction of the forceps into the bladder, but the violence which is used in extracting the stone or stones which produces mischief; thus the removal of one large stone is more to be dreaded than that of many small. Removal of a number of stones not dangerous.

When more than one calculus exists, the first extracted is found smooth, and often hollowed by the friction of the others; so ttha the form of the first shows the existence of a second or more. Stones rounded or hollowed, when more than one.

The form of stone varies extremely; but when there is only one, it is generally oblong; when more than one, they are usually rounded and smooth: and when very large, they assume the form of the bladder. Form of stones.

The surface of stones is sometimes smooth; as the uric acid calculus; a little irregular when composed of triple phosphate; and very rough if formed of the oxalate of lime: this latter is called the mulberry calculus. But the severity of the symptoms does not always depend on the irregularity of the surface of the stone, but on the irritability of the bladder. Surface of stones.

Calculi are generally composed of concentric lamellæ, formed upon a centre, called the nucleus. The colour of the different layers varies considerably, and the materials of which they are composed are of very different nature: some calculi are brown, some are white. Composed of lamellæ.

The nucleus, or centre, is often some extraneous body introduced into the bladder, as a portion of coagulated blood, a piece of bougie, or catheter. Nuclei.

In the collection at St. Thomas's Hospital are preparations exhibiting various foreign bodies, as forming the nuclei to stones; as a portion of slate pencil; a needle, which had traversed a part of the body previous to its entering the bladder; also a piece of tobacco pipe, which had been introduced into the urethra by the patient, to relieve some impediment to the passage of the urine, it broke and passed into his bladder, and was extracted some time afterwards by Mr. Godwin, surgeon, at Derby, with a stone formed around it. Sometimes a small stone of uric acid forms in the kidney, and

descending by the ureter into the bladder, it there acquires an increase from the formation of a calculous deposit on it, of a different nature.

COMPOSITION OF URINARY CALCULI.

My friend, Dr. Dowler, who has paid much attention to the analysis of these calculi, has favoured me with the following account:

Urinary calculi of the human body may be comprehended under the following species.

1. Lithic acid, or uric acid calculus.
2. Lithate of ammonia.
3. Phosphate of lime, or bone earth.
4. Triple phosphate, or phosphate of magnesia and ammonia.
5. Oxalate of lime, or mulberry calculus.
6. Cystic oxide.

Besides these, other substances have been mentioned as forming distinct species of calculi, such as xanthic acid, carbonate of lime, and the fibrinous calculi; but they are of extremely rare occurrence.

The above calculi present the following chemical characters.

1.* Lithic acid calculus. Before the blowpipe it blackens and emits a peculiar smell, somewhat resembling that of burnt feathers; it is soluble in the caustic fixed alkaline solutions by the assistance of heat, and is again precipitated from these by the addition of an acid. The nitric acid dissolves and decomposes it with effervescence; if the solution be evaporated to dryness, a new acid, called the purpuric, and ammonia are formed; these, uniting, produce a purpurate of ammonia, which is of a pink colour, and soluble in water.

2. Lithate of ammonia. By the addition of a caustic fixed alkali, ammonia will be disengaged. The lithic acid may be shown by

* I have omitted every character which is not essential to the particular species.—D.

treatment with nitric acid, as in the former instance. When mixed with triple phosphate, its presence is ascertained with difficulty. It is more soluble in water than the lithic acid calculus, and is of a clay colour; but its characters have not as yet been sufficiently investigated.

3. Phosphate of lime. Before the blowpipe, it first blackens, then becomes white, and afterwards resists the action of heat. If, after being heated in order to decompose the contained animal matter, it be dissolved in very dilute nitric acid, the subsequent addition of nitrate of silver will produce a yellow precipitate, which is a phosphate of silver, and of course indicates the presence of phosphoric acid. The lime may be detected by adding oxalate of ammonia to the above nitric solution.

4. Triple phosphate. Before the blowpipe, it emits an ammoniacal smell, becomes reduced in size, and at length melts with difficulty. The caustic fixed alkalies disengage ammonia. It is very soluble in dilute acids, and the subsequent addition of ammonia causes it to be precipitated in a crytalline form.

5. Oxalate of lime. When heated by the blowpipe it swells, its oxalic acid is decomposed, and the lime is left in the caustic state. When digested with carbonate of potash, a double decomposition follows; and the oxalate of potash, thus formed, presents its peculiar characters, which are indicative of the presence of oxalic acid.

6. Cystic oxide. This calculus may be readily distinguished by its external appearance. Before the blowpipe it emits a peculiar and fœtid odour. It is soluble in a solution of the neutral carbonates of soda and potash; also in those of the caustic alkalies, and most of the acids. Its solution in nitric acid is precipitated by alcohol.

The Xanthic oxide, of which only one specimen has as yet been observed, was so named by Dr. Marcet, from the circumstance of its producing a peculiar yellow compound with nitric acid.

Carbonate of lime is sometimes, but very rarely, met with, forming small urinary calculi. These effervesce in dilute muriatic acid, and a precipitate is formed by the addition of oxalate of ammonia to the muriatic solution.

The fibrinous calculus, observed by Dr. Marcet, was probably formed from the fibrin of blood which had accidentally escaped into the bladder: it possessed the usual character of fibrin.

Mr. Brande analyzed one hundred and fifty stones, from the collection of Mr. Hunter, and the materials of which they were composed were as follow:

Uric acid	16
Uric acid plus, triple phosphate minus	45
Uric acid minus, triple phosphate plus	66
Triple phosphate	12
Uric acid on phosphate nuclei	5
Oxalate of lime	6

In addition to these, Dr. Wollaston found one of the cystic oxide; but Dr. Marcet met with this stone in the kidney: it is not composed of lamellæ, like the other calculi.

TREATMENT.

Medical treatment.

With respect to the medical treatment of calculi, I do not believe in the power of chemistry to dissolve a stone in the bladder, if it acquire any considerable magnitude. The medicines, given for this purpose, become so much changed in their passage through the circulating and secreting system, that their chemical influence is in a great measure destroyed. They may alter the surface of a stone, so as to render it soft and less irritating; but they do not prevent a calculous secretion.

Case.

Dr. Baillie and myself attended a gentleman from Birmingham, who secreted a large quantity of triple phosphate, which appeared in white crystals in his urine: we gave him the muriatic acid, and the secretion of the triple phosphate ceased, but uric acid was produced in equal abundance: he had then alkalies given to him, and the triple phosphate reappeared; he was at length, but not under many months, cured by attention to his diet and general health.

I had a patient in Guy's Hospital with a stone in his bladder, in whom various experiments were tried to dissolve the stone by chemical menstrua. A catheter was introduced into the bladder, and through it injections were thrown; thus an opportunity was given for a direct application of the menstruum to the stone. After a lapse of time, I said to this man, "Well, have my medical friends dissolved the stone?" his answer was, "No, Sir, and I have given up all the injections except opium, from which I receive considerable relief." The patient died in the Hospital, and, on examination after death, a stone was found in his bladder. Case.

But although a stone cannot be dissolved in the bladder, yet the irritability of the latter may be so far diminished by alkaline remedies, as to enable the patient to bear the disease with much less suffering. Alkalies may lessen the sufferings.

Admiral Douglas was the subject of stone; I sounded him, and in the evening of that day a portion of the stone was discharged by the urethra, and I sent it to my friend Dr. Marcet for analysis, who found it to be oxalate of lime; I therefore gave him acids, but he was not relieved by their use; he then took subcarbonate of soda ʒss. four times in the day, in some water. Some months afterwards I was requested to meet Dr. Reynolds and Sir E. Home in consultation upon the case of the Duke of Portland; and when I entered the room, Sir Everard said, "Cooper, how did you dissolve the stone in Admiral Douglas?" to which I answered, "I never dissolved a stone in my life."—"But," said Sir Everard, "he expresses himself well from some medicine you ordered him." I called in consequence on the Admiral at his hotel; when he said, "You saw me in dreadful agony, unable to cross a room; but since I have taken the soda, I went from Yarmouth, in Norfolk, to Portsmouth, by land, and bore the journey well; and I could now go down a country dance." Yet the stone still existed in his bladder; but the soda had lessened its sensibility, so as to enable him to bear the complaint without much suffering, and only a little inconvenience from the stone, which still occasionally stopped the flow of urine. Case.

Magnesia and soda have been recommended together; but as Magnesia and soda.

many stones are magnesian, the use of the former medicine may be improper.

Diluents.

Great dilution relieves the severity of the symptoms, and more especially mucilaginous drinks.

Stomachic medicines.

Medicines which assist the digestive process are the most appropriate to prevent this disease, as it is often the result of taking food which is difficult of digestion; or of a weakened state of the stomach, which renders common food indigestible.

Disease returns.

After removing a stone from the bladder, a medical treatment should be adopted, to prevent a return of the disease. The uric acid and oxalate of lime calculi return less frequently than the triple phosphate, which are very often reproduced.

Case.

I cut a Mr. Miles for the stone, and removed a triple phosphate calculus; in about twelve months the disease returned, for I sounded him, and found a stone. Mr. Layford, an excellent surgeon at Winchester, extracted this stone by the usual operation; yet, on examination of this gentleman's body after his death, which occurred several months subsequent to the second operation, several calculi were found in his bladder.

In another case, in which I extracted a triple phosphate calculus, from a patient of Mr. Van Oven's, in the city, the disease returned, and I again performed the operation, and found a large coagulum of blood in the bladder, surrounded by a triple phosphate deposit.

LECTURE XXXI.

OF THE OPERATION OF LITHOTOMY.

Previous inquiries

Before performing the operation for the stone, it is right to inquire carefully if the functions of the body are well performed in other respects: if the digestion be tolerably good, and the breathing and circulation be free. For if the liver be diseased; if the chest be oppressed; or if the heart have an irregular action, the patient does

not in general recover from the operation. Pain in the loins, vomiting, or the discharge of matter, indicating disease of the kidneys, also form insuperable objections to the operation.

A patient came into Guy's Hospital to be cut for the stone; I sounded him and found a calculus, but he made water almost immediately, and at the time discharged a considerable quantity of matter. I saw that he was emaciated; he complained of pains in his loins, and his stomach was much disordered. I therefore said, "I will not operate upon this man, for he would die from the operation." In less than a month he died, and I was happy that I had not operated, as one kidney was found wasted, and the other at least twice its natural size, with its cavities full of a purulent secretion. Case.

The success of one surgeon being greater than that of another chiefly depends upon his judgment in this respect, viz. not to operate when there is much functional or any organic disease.

The age of the patient does not much influence the result of the operation, with the exception I shall mention. Old age is not to be a bar to it, if, so far as the stone will permit, the patient be active, and has no other complaints. I generally, therefore, say to a patient, "If the stone were removed, would you be capable of taking exercise? is your digestion good? is your breathing free?"—If he answers, Yes, the operation may be performed. The age of the patient.

Mr. Cline operated successfully upon a patient at 82: Mr. Attenborough, of Nottingham, at a still more advanced age. I operated upon a gentleman aged 76, who had been near sixty years in the island of Jamaica: I performed the operation in 1812, and he died about ten years after, having returned to Jamaica and enjoyed his health there.

About sixty years of age is the period at which stone is most frequent in the adult, and then the operation is very successful. In the middle period of life, fever is more violent from the operation, and the patient is often too much loaded with adeps to be submitted to it. Fat persons do not generally bear operations well, they have little vital power; they should be reduced by diet and medicine, and they must be acccustomed to irritation of the bladder, by the frequent Sixty a favourable age.

introduction of the sound; but still they have more fever and disposition to peritoneal inflammation, than at a later period of life.

The most favourable age.

The age at which there is least danger from the operation is from three to twenty, for death is then a very rare occurrence. Under the age of two years, children often become convulsed and die from the operation, on account of their excessive irritability.

Average number of deaths.

The number of deaths from the operation, taking all ages, is one to eight. Fat persons at all periods, but more especially in middle life, are those who most frequently die. A surgeon sometimes proceeds to twenty or even thirty cases with extraordinary success; but then he loses several patients, which still produces the average I have experienced.

Previous preparations.

A short time prior to the operation, in addition to the exhibition of purgatives, &c. an enema should be administered, in order to empty the large intestines, and particularly the rectum, which, if distended with fæculent matter, would be in great danger of being wounded.

OF THE OPERATION.

The table.

The table on which the patient is to be placed, should be two feet six inches high; it is to be covered with two blankets and a sheet, and several pillows are required to support the patient's head and back.

Bandages.

Three bandages are required to secure the patient; of these, two are employed to confine each hand and foot of the same side together; a loop, at one extremity, is first passed around the wrist, and the patient then grasps the outer side of the foot, about its middle, having the bandage passing from the wrist between the two; the bandage is then passed under the foot, brought round on its inner side over the instep, and so round the wrist and ancle; after two or three turns around these parts, it should be passed over the hand and under the foot, then to the wrist and ancle again, until the whole is used. The other bandage is to be placed round the back part of the neck, and each extremity being passed under the ham of

the same side from within to without, they are to be carried back and tied behind the neck. These bandages prevent the patient from making any movements likely to impede the operation, or occasion danger during its performance.

The instruments required are, first, a sound, consisting of a solid portion of steel, curved as the urethra, about twelve inches in length; its thickness should be well proportioned to the size of the urethra. Instruments. First the sound.

Persons often require to be sounded with their bladder full, and with it empty. I have frequently found a stone directly after the urine has been discharged, which I could not perceive when there was much urine in the bladder. It is right, therefore, to sound the patient first with his bladder full; and, if the stone cannot be felt, then to have it emptied, and sound again. On this account, it is often useful to employ a silver catheter, at first preventing the escape of the urine, and afterwards allowing it to flow through the instrument, at the same time continuing to sound. When the bladder is empty, it frequently happens, however, that the instrument is so confined that it cannot be moved sufficiently to strike the stone. State of the bladder when sounding.

The patient should be sounded first in the recumbent position, and if the stone be not then felt, in the erect; as the calculus, by falling upon the urethra in the latter posture, may be easily detected. Position of the patient.

I have myself sounded and not detected a stone at one time, which I have afterwards felt. I have sounded and not discovered a stone, which another surgeon has afterwards perceived. I cut a patient, and extracted thirty-seven stones from his bladder, who had been sounded and declared not to have a stone. Stone not always detected.

Those who have not had experience in this disease, and have not frequently sounded patients afflicted with it, sometimes mistake the extremity of the sacrum, or the os coccygis, for a stone.

The next instrument is the staff, which is somewhat similar to the sound, but rather more curved, and having a groove on its convex part; this groove should be as large as possible; first, The staff.

because it is more easily cut into; secondly, because the gorget or knife passes more readily by it into the bladder.

How to be held.

When performing the operation, the staff is to be held by an assistant, perpendicularly, or nearly so; and its extremity should, if possible, rest upon the stone; its groove is to be slightly inclined to the left side of the rapha of the perineum. Nothing can be more unsafe than to incline the handle of the instrument towards the patient's abdomen, as it draws its point out of the bladder into the urethra; and when the gorget or knife is passed on it towards the bladder, either is likely to slip between it and the rectum.

Position of the patient during the operation.

Before commencing the first incision, the surgeon should see that the patient be placed evenly upon the table, so that one side be not higher than the other; and also that the shoulders be sufficiently raised, and well supported.

The scalpel.

The knife, for commencing the incision in perineo, should have a considerably convex cutting edge, as by it the urethra is more freely opened. The scrotum being elevated, the incision is begun opposite the under part of the arch of the pubis, and is continued on the left side of the raphe, along the perineum, as far as mid-way between the tuberosity of the ischium and the anus.

The first incision.

The first incision should divide the skin, &c. and expose the accelerator urinæ; the second should be carried between the left crus penis and the bulb; the latter being pressed towards the right side by the fore finger of the surgeon's left hand.

A part of the accelerator urinæ is divided, and the transversus perinei should be freely cut, as it forms a great impediment to the extraction of the stone, if undivided.

Opening the urethra.

The next incision should be made into the groove of the staff, by cutting into the membranous portion of the urethra; for this purpose the knife must be directed upwards, and not horizontally, otherwise the rectum is endangered: the opening made to expose the groove of the staff should be an inch in length.

A gorget, or a knife with a probed extremity, is next usually employed, to complete the opening into the bladder.

The gorget may be considered as the dividor of the prostate gland and it also serves as a director to the forceps. It was formerly used with a blunt edge, so that it acted as a wedge: when so formed and employed, the scalpel should be carried along the groove of the staff, so as to divide the prostate gland laterally, after the urethra has been opened, which allows the blunt gorget to enter the bladder with comparative facility. The operation performed with this instrument is attended with very little bleeding, and has been very successful in its issue. The gorget. The blunt gorget.

Hawkins had one of the edges of the blunt gorget made to cut. Mr. Cline made the greatest improvement upon the cutting gorget, in having the left side entirely removed, leaving only the beak and its right blade, which had a sharp anterior edge: this instrument enters with ease. It should be introduced horizontally, for there is considerable hæmorrhage if it be introduced obliquely, as it then opens a plexus of vessels surrounding the prostate, and which is continued to the vesiculæ seminales, and terminates in the internal iliac veins. Cutting gorget.

It is quite contrary to my experience to say, that persons do not die of hæmorrhage after this operation, for I have known many instances of it; four in particular, in which death was the immediate consequence of bleeding, suffered to continue for several hours; and several I have known die from gangrene of the scrotum occurring after severe hæmorrhage. The patient should never be left until the bleeding has ceased; and, if it be very considerable, the surgeon should place his finger within the wound and compress the bleeding vessel; but he should be careful not to quit his patient whilst any hæmorrhage remains. Hæmorrhage.

It is best to use a small cutting gorget, as it lessens the danger of wounding blood-vessels; and then, if necessary, on account of the size of the stone, to dilate the wound, do it with the blunt gorget.

The beak of the cutting gorget is passed into the groove of the staff, where it has been previously opened at the membranous part, and the instrument is then pushed along the groove into the bladder, Mode of passing the gorget.

[illegible]

Size of the gorget.

The angle of the gorget should be proportioned to the size of the patient. The operator if in taking part, when used for an adult, should not exceed one inch; and the same gorget should be used if the first opening is not sufficiently free.

The gorget which I at first used in my own operations was curved, and the point very sharp; but I thought it occasioned too much wounding, and cutting more than was absolutely necessary for the extraction of the stone.

The knife.

The knife is now frequently substituted for the gorget, and that which I for some time employed, in various cases, was straight and narrow, with a pointed end.* After opening the membranous part of the urethra, as before, I passed this knife along the groove of the staff into the bladder. In the young this answers very well, and also in a thin adult; but in a deep perineum, or enlarged prostate gland, I prefer the gorget, as being more definitive in its cut.

The forceps.

Forceps of various sizes are also required to lay hold of the stone, and those employed must depend on the bulk of the patient: the handles should occupy two-thirds, and the blades one-third of the length. I have tried many others of different proportions, but think that which I have mentioned the best. Some of the blades must be flat, for small stones, or fragments of stones; some should be curved, to remove calculi from behind the pubes or prostate: one pair should be large, as small forceps will not retain a large stone in their grasp, with sufficient firmness to extract it.

The forceps must be passed along the groove of the gorget with

* Mr. Thomas Blizard, who was an excellent and successful operator, employed a knife of the same kind, excepting that the beak was at an angle with the blade, instead of straight.

great care, and the gorget must be well retained during their passage. I have seen the forceps pass between the bladder and rectum, from the surgeon's pulling back the gorget as he thrust forwards the forceps, which should never be done. The gorget must not be removed until the surgeon has thrust his finger forwards to feel that the groove of the staff has been freely opened. I frequently, if the perineum be not very deep, remove the gorget after it has entered the bladder; and introduce the forceps by my finger, carried along the groove of the staff.

Mode of using the forceps.

When the forceps have passed into the bladder, the gorget and staff are to be removed; and the surgeon, before opening the forceps, should sound with them for the stone. When the situation of the calculus has been thus ascertained, the blades of the forceps are to be separated and the stone received between them; and this must be done with great gentleness, not only to save the patient pain, but to prevent any injury to the internal surface of the bladder.

When the stone is drawn down to the opening in the perineum, wait a little for the cessation of muscular action from the perineal muscles, and introduce the finger by the side of the forceps, to feel if any obstruction exists, and to press it out of the way of the stone; for the finger is the best instrument for this purpose. It is right to turn one blade of the forceps to the pubes, and the other to the rectum, as the stone cannot then injure the urethra. If the extraction of the stone be violently resisted, disengage and remove the forceps, then introduce the finger and feel how the stone is placed, and, if necessary, turn its long axis into the direction of the long axis of the bladder.

Having grasped the stone with the forceps, do not be hasty in extracting it, but be gentle in the employment of your power, depending upon the gradual, rather than the sudden exertion of force. The great danger, and the most frequent cause of death, in my opinion, arises from the surgeon's employing excessive violence with the forceps; first, bruising the bladder; secondly, disengaging it from its situation by tearing down its natural adhesions; it

injures the peritoneum, and brings on peritoneal inflammation; thirdly, it injures the prostate, sometimes tears the urethra at the membranous portion; and I have known the rectum lacerated, where it had not been injured by the incisions, which can only arise, in the use of the knife, from ignorance or negligence.

If the stone cannot be grasped with the straight forceps, a curved pair should be employed.

The operation for the stone consists, therefore, first, in opening the membranous part of the urethra, and dividing the transverse perineal muscles on the left side with the knife, and exposing the groove of the staff; secondly, in dividing the left half of the prostate gland horizontally, and that portion of the bladder connected with it, by means of the gorget, or probed knife; thirdly, in introducing the forceps, by which the stone is seized and extracted.

OF THE DIFFICULTIES AND DANGERS OF THE OPERATION FOR THE STONE.

Stricture in the urethra.

If the urethra be the subject of stricture, do not perform the operation until it will admit a large staff. The strictures being removed, the operation is less difficult, and the recovery quicker and more certain.

Enlarged prostate.

An enlarged prostate gland offers great difficulties to the operator, and if the stone be of large size, the patient will seldom recover, as the impediment to extraction is excessive, and the violence obliged to be used such as the patient can ill bear, at the period of life at which such disease of the prostate occurs. It is, therefore, in such cases, a very fortunate event when the stone breaks, as it is removed with less risk to the patient, although it renders the operation tedious.

Lateral enlargement.

A lateral enlargement of the prostate gland produces less difficulty, if it be freely divided, than the enlargement of the middle lobe; and this gland should always be examined per anum in aged persons, to prevent the surgeon being baffled by this disease, and if

he finds it enlarged laterally, he must use a large gorget, or else divide freely with the knife.

If it be an enlargement of the third lobe, the circumstance is known by the passage of the staff, which only enters the bladder by its handle being greatly depressed; also by the stone being felt distinctly at one time and not at another; and here let me observe, that when this happens in sounding, I have generally found some difficulty in the operation. The curved forceps are proper to be used in this form of disease. Middle enlargement.

The enlarged prostate gland often gives rise to another difficulty, by occasioning a sac to be formed immediately behind it, in which the stone is principally lodged, its extremity only projecting into the bladder so as to be felt by the forceps; in this case the curved forceps are required, and the finger must be passed up the rectum, to raise the stone from this situation, and to bring it into the axis of the bladder. Sac behind the prostate.

A portion of the prostate is sometimes nearly separated in extracting the stone, so as to be afterwards pendulous into the bladder; this occasions symptoms somewhat similar to those of the stone to remain. This happened to Mr. Cline, who operated upon a gentleman very successfully as to the immediate result, but who, after his recovery from the operation, found all the symptoms of stone return. He lived a long time after, and before his death desired that his body might be opened. Mr. Ramsden inspected the parts, and sent me the bladder, which is now in the collection at St. Thomas's Hospital, and a portion of the prostate gland hangs by a narrow neck into the bladder; this portion, by falling on the urethra, produced the symptoms. Part of the prostate nearly detached.

From the enlargement of the third lobe of the prostate gland, little advantage is, on the same account, derived from the operation of lithotomy, as the patient still experiences all the symptoms of stone, excepting that the urine is not usually bloody; but even this circumstance I have known to happen. Enlargement of the third lobe.

I have seen a difficulty arise in performing this operation, from a partial contraction of the bladder, by which the stone has been Contraction of the bladder.

firmly embraced, so as to impede the use of the forceps. This arises from the sudden escape of the urine which the bladder contained previous to the operation. The fungus of the bladder, and half of the organ near to it, embrace the stone closely, the forceps are passed into the anterior part of the bladder, and opened at its cervix; but, in attempting to seize the stone, only one of its extremities is nipped by the forceps, which slip from it immediately the surgeon tries to extract the calculus; this occurs several times, until the patient becomes exhausted, when the contraction of the bladder subsides, and then the stone is readily seized. In such a case the flat forceps answer best, gliding most easily over the stone. If the patient does not retain his urine for a long period before the operation, this difficulty seldom occurs.

Narrow pelvis. In persons who have been the subject of rickets, the pelvis is sometimes so narrow as to render the performance of this operation excessively difficult. I once saw Mr. Cline operate in a case of this kind, and only his coolness and perseverance could have overcome the obstacles it presented. The subject was a child; the tuberosities of the ischia were very near each other, and when the forceps were introduced into the bladder, only the handles remained external to the wound; the extremity of the stone only could be caught hold of, and from this the forceps repeatedly slipped. Mr. C. finding that the longest pair of forceps usually employed for children would not reach beyond the centre of the stone, and that it could not be held by them, introduced a pair of forceps made for an adult, and with these he succeeded in grasping the stone, but the opening of the pelvis was too small to admit of its being extracted whole; he, however, after repeated efforts, broke the calculus with the forceps, and removed it by fragments. The child afterwards recovered.

Large stone. The stone is sometimes so large as to produce great difficulty in the extraction. The largest which I have successfully removed has been between five and six ounces; but I remember to have seen one in the Norwich Hospital, which weighed eight ounces, and was extracted without being broken. If broken, a very large stone

may be successfully removed. Mr. Mayo, of Winchester, in this way, extracted one weighing altogether fifteen ounces. The largest which I have extracted whole was from Mr. ——, of Fore Street, in the city, a relation of Mr. Field's, surgeon, in Wilderness Row; it weighed sixteen ounces; I was obliged to extend the incision in perineo to the sacro sciatic ligaments, and when I seized the stone with the largest forceps, I found I could not extract it; I therefore endeavoured to bore a hole in it with a gimblet, as I held it between the blades of the forceps, but scarcely made any impression upon it: at last I succeeded in removing it in the following manner: Mr. David Babington, son of Dr. Babington, then my apprentice (a most amiable and excellent young man, who entirely fell a victim to his professional zeal, and who, if he had lived, promised to be one of the highest ornaments of his profession,) assisted me. I placed a single blade, or crotchet, on the upper part of the stone, under the symphysis pubis, and then, whilst I pulled the stone with the forceps through the opening in perineo, Mr. B. pressed down the stone by elevating the handle of the crotchet, and thus brought it below the line of the symphysis pubis, and thus it was extracted. The time occupied by the operation was nearly an hour, and the patient survived only a few hours. Case.

For extracting very large calculi, a free incision is required, and the forceps must be large and strong. Mr. Cline had some made so that the blades could be introduced singly and joined together afterwards; or one blade could be used alone, as above described. Forceps with blades which separate.

Forceps have been constructed with teeth, to break a large stone; and Mr. Earle has invented a perforator for the same purpose: such an instrument, easily applied, is in the highest degree desirable. Instruments to break large stones.

Soft stones create a difficulty in the operation, by rendering it necessary to remove the stone in fragments. It is thought to be very desirable afterwards to wash out the bladder by means of a syringe, with a view to prevent the future formation on any remaining portion. I believe it is better to use the scoop, and to remove with it all the particles of stone which the urine cannot carry off, such as sand; for injecting the bladder will not remove frag- Soft stones.

ments, and the after-flow of urine through the wound will remove sand.

Necessary caution.

Stones are often broken which might be removed whole, if the surgeon were less violent, and more cautious. The mode of preventing them from breaking is, when the stone has been seized with the forceps, to put the index finger between the handles, so as to prevent them violently approximating, and to limit the degree of pressure.

Number of stones.

A number of calculi render the operation more tedious, but not so dangerous as one large stone. It is not the number of times that the forceps are introduced, but the violence used with them, which endangers the patient. When there are several in the bladder, care must be taken that none be left; and the surgeon must not be content with examining by the forceps only, but it is best to pass a sound into the bladder, either by the urethra or by the wound, to feel if any remain; he should also pass his finger into the rectum and raise the prostatic part of the bladder, so as to throw any stone lodged there into the axis of the bladder; as it often happens that the prostate gland is enlarged when several stones exist, and they are generally situated behind this enlargement.

Calculi not always detected.

In the instances of the greatest number of calculi which I have seen, it was doubted for a length of time if any existed; yet, in one case, the urine had been repeatedly drawn off, and in the other the patient had been several times sounded, but a stone could not be felt:—on examination, after the patient's death, fifty-six stones were found in the bladder.

Form of the stone.

The form of the stone sometimes adds to the difficulty of its extraction; if its long axis much exceeds its breadth, when seized by the forceps in the centre it will not pass the opening in the bladder, from its extremities projecting on each side of the forceps: the surgeon, finding great resistance, should withdraw the forceps, and passing his finger into the bladder, he should turn the stone, and place its long axis from the fundus to the cervix, after which it can be easily extracted.

Sacculi enclosing stones.

Sacculi in the bladder sometimes enclose stones so far, that only the end projects into its natural cavity, and can be alone felt by the

forceps. In my own practice I have met with only one decided case of this kind, which was the following:

A boy was admitted into Guy's Hospital, in whose bladder, by sounding, I found a stone; but the symptoms were less urgent than usual, and each time I sounded, the stone was felt in the same part of the bladder. This led me to examine per rectum, and I then perceived a stone lodged and fixed at the under part of the bladder over the rectum, I therefore made an incision between the bladder and rectum in perineo, and, directed by my finger in the rectum, I reached the stone without wounding either the rectum or bladder; I then opened the sac with the knife, and seizing the stone with a pair of dressing forceps, I extracted it. The boy for three days only passed his urine by the wound, and then it took its natural course, and the wound healed rapidly. Case.

In a case which I attended with Mr. James, surgeon, at Croydon, he found, on inspection of the body after death, two calculi, having large extremities connected by a narrow stem, one extremity of each was situated in a sac, and the other extremity in the cavity of the bladder. Case.

As I have stated, a sacculus behind an enlarged prostate gland is a frequent occurrence, but the calculi are only occasionally falling into its cavity.

Corpulency greatly increases the danger of the operation, as well as its difficulty. The perineum is often so deep as to render it impossible to reach the bladder with the finger; and, if the stone be large, the impediments to its extraction are greatly augmented, by the resistance afforded by the perineum. Corpulency.

When a child has been long subject to prolapsus ani, it often becomes troublesome at the time of the operation. The anus should be supported by an assistant at the time the surgeon commences the operation, or it protrudes whilst he is making his incision. It may be observed, that in cases in which the prolapsus happens after opening the bladder, that if the instruments be withdrawn, they cannot again be introduced until the prolapsus be returned. Prolapsus ani.

OF THE CAUSES OF DEATH FROM THE OPERATION.

The causes of death from lithotomy which I have witnessed are:

Nervous irritability in children.

First, Nervous irritability occurring in very young persons: they are generally pale and almost comatose on the day after the operation; on the day following, their eyes roll quickly, and there is excessive restlessness; they then become extremely weak, are convulsed, and expire. To relieve this irritable state, calomel and opium are the best remedies.

Peritoneal inflammation.

Secondly, Peritoneal inflammation, occurring when much violence has been used in extracting the stone.

The symptoms are; vomiting, tenderness in the region of the bladder, tension of the abdomen, and difficulty in procuring motions.

The treatment consists in administering calomel purges, in applying fomentations, leeches, and blisters to the abdomen; in bleeding from the arm, and the use of the warm bath.

In inspecting these cases, I have seen not only inflammation of the bladder and peritoneum, but extravasation of blood between the bladder, pubes, and abdominal muscles, showing that the bladder had been drawn down during the extraction of the stone. The removal of a large stone, when the prostate gland is enlarged, kills in the same manner.

Hæmorrhage.

Thirdly, Hæmorrhage. This I have seen repeatedly destroy life, and it has been with no small degree of surprise that I have heard it denied to be a cause of death.

Case.

I cut a man in Guy's Hospital at one o'clock in the day; the operation was soon over, and apparently under the happiest auspices; the patient was put to bed, and I soon after quitted the Hospital. In the afternoon the man became faint and vomited several times. At nine o'clock in the evening, the sister of the ward, in turning down the bed-clothes, found the lower part of his body surrounded with blood, and the man was extremely faint. Mr. Callaway, my apprentice, was sent for, but the patient died in an hour.

A surgeon should not quit his patient until the bleeding caused by

the operation has ceased: the patient should not be put to bed whilst any hæmorrhage continues; and when in bed he should be very lightly covered for some time.

I find that bleeding more frequently occurs when the gorget is passed obliquely, in the direction of the external wound, than when it is passed horizontally.

Fourthly, Gangrene of the scrotum. This I have seen several times, in persons who have been of intemperate habits, or in those extremely weakened by age. Gangrene of the scrotum.

Fifthly, Extravasation of urine into the scrotum, producing great inflammation and swelling, and leading to gangrene; it arises from the incision being made too high, so as to open the cellular tissue of the scrotum. Extravasation of urine.

After the operation of lithotomy, the scrotum should be always supported by a bandage, to prevent the urine which flows through the wound, from irritating it, and thus the disposition to gangrene is lessened. Scrotum to be supported.

Sixthly, An ulcerated state of the bladder, shown by offensive urine, evacuation of mucus and of pus, mixed with blood, in some, are sufficient to lead to a fatal issue in lithotomy. Ulceration of the bladder.

Seventhly, Diseased kidneys, whether inflamed, wasted, suppurating, ulcerated, or containing stones; marked by pain in the loins, by purulent discharge, and by a disordered stomach. Diseased kidney.

Eighthly, Visceral disease, as a morbid state of the liver; dyspnœa from some chronic affection of the lungs; palpitation of the heart; irregular or intermitting pulse; which tend to destroy the powers of restoration. Visceral disease.

OF THE AFTER-TREATMENT.

When the operation is concluded, the patient is unbound; but the legs should not be immediately brought together if any bleeding continue, as the blood is apt to pass back into the bladder, where it coagulates; and producing great urgency to make water, the coagulum is forced out, occasioning a renewal of the hæmorrhage.

To be kept dry.

No dressing is to be applied to the wound, but a folded sheet or napkin is to be placed under the nates of the patient in bed, and this should be frequently examined, to ascertain if the urine be secreted and pass away: it should be changed for a dry one whenever it becomes wet.

Opium.

Opium may be given, if the patient be very irritable; but as it is apt to check the action of the intestines it should not be administered unless absolutely necessary.

Diluents.

The patient should be allowed to take diluents freely at first; such as linseed tea, or barley water with gum acacia in it; and, when the danger of inflammation has passed, beef tea, broth, or gruel may be given.

Saline medicines, with excess of alkali, are useful; if a tendency to fever or inflammation arise, purge the patient with castor oil, and foment the abdomen; if it increase, give calomel and antimony, and occasionally castor oil; if the pain in the abdomen become severe, bleed from the arm of the adult, and apply leeches to the abdomen of a child.

Tying the legs together.

When the wound begins to granulate, and not before, tie the legs together; as much mischief arises from doing so, soon after the operation; First, in bleeding, as already mentioned; Secondly, it prevents the free escape of the urine; it is of no use until the wound be disposed to close.

Position.

It is not necessary that the patient should rest on his back only; there is not any danger in his turning to the side, and great relief is often obtained by it.

Passage of the urine.

The urine passes, in some cases, entirely by the urethra in the first few hours, but this is not desirable; the patient suffers less in its discharge, and has less local irritation, if it escapes easily by the wound. In cases of enlarged prostate gland, it is proper to introduce a flexible catheter by the urethra, to permit the urine constantly to flow off. When the urine, under the common consequences of the operation, takes its natural course, the patient frequently suffers from a rigor.

Recovery.

Children usually recover from the operation in about three weeks,

and adults in about a month: sometimes both have the wound healed within a shorter period.

I have known two evils arise from the operation; one, a loss of the power of the retention of urine, when the patient is obliged to wear a yoke, or jugum; the other, an interruption to the passage of the semen, from some injury done to the veru montanum, where the united ducts of the vesiculæ seminales and vasa deferentia terminate. Evils following the operation.

I know a gentleman, who has undergone this operation, has pain in coitu, but does not pass any semen, although he experiences the orgasm. Case.

The patient's digestion and state of urine require to be attended to after the operation, to prevent a return of the disease.

Mr. Key, surgeon of Guy's Hospital, performs the operation of lithotomy in a different manner from that usually adopted. The points in which it differs from that commonly performed consist in the employment of a staff, nearly straight, and a scalpel-formed knife, which serves both for the external incision and for the division of the prostate gland, thus obviating the necessity for a change of instruments. The staff is slightly curved for about an inch from its extremity, to enable it to pass more easily over the prostate gland, and the knife is about twice the length of a common scalpel. The mode of performing the operation is as follows: the patient being secured, and the staff introduced into the bladder, an assistant is to hold the handle of the instrument inclined somewhat toward the operator, in order to keep its extremity projecting some way into the base of the bladder. The staff having been fairly laid open by the usual free external incision, and the point of the knife being steadily pressed against the groove, the operator takes the handle of the staff in his left hand, and lowers it till he feels his hand checked by the ligament of the pubic arch. In this movement of the staff, the prostate is raised from the rectum, the ligament of the arch acting the part of a fulcrum, and the staff that of a lever, by which the gut is put out of danger of being wounded. The groove of the staff and the edge of the knife are then to be turned,

by an easy simultaneous movement of both hands, in the direction most favourable for the free division of the prostate, which will be about an angle of 50° with the horizon. The knife is now to be carried gently along the groove through the prostate into the bladder, until the gland is completely divided, which the operator easily ascertains, by the resistance afforded to the knife ceasing.

In passing the knife, to complete the section of the prostate, its handle should be lowered to the bottom of the external incision, by which a sufficiently large angle is formed between the knife and staff, and thus an opening in the gland is made, large enough to admit the extraction of a moderate sized stone. When the stone is of unusual dimensions, or the prostate increased in size, it will be advisable to dilate the opening in withdrawing the knife, in the same manner as when the beaked knife is used: in common cases the knife may be withdrawn along the groove of the staff without the necessity of dilating.

OF THE HIGH OPERATION, OR THAT ABOVE THE PUBES.

Not successful.

Attempts have been made to revive this operation, in this country and in France; but in England, hitherto, they have been very unsuccessful.

Preferable under peculiar circumstances.

Those who have witnessed the general safety and facility in performing the lateral operation will never make use of the high operation, but under peculiar circumstances; as when the prostate gland is very much enlarged, or when a stone of great size exists. My opinion is, that it should be confined to a combination of these two circumstances, viz. the large stone, and large prostate, which render the operation in perineo very unsuccessful. Those who wish to be fully informed on this subject will consult the work of Mr. Carpue, who has taken great and very laudable pains to explain this operation.

OF REMOVING STONES FROM THE BLADDER BY THE URETHRO-VESICAL FORCEPS.*

When a great number of calculi are found in the bladder, there is generally an enlargement of the prostate gland, and a sacculus formed in the bladder directly behind it. In these cases the bladder is rarely emptied completely of its fluid contents, and calculi form from the urine retained in the sac. Number of calculi.

Such stones do not in general acquire the magnitude of those formed under the usual circumstances; and from their number and friction against each other, their surfaces are generally smooth, and their shape rounded. Fifty-six such calculi were found in the bladder of Mr. Perkins, the brewer, who died from retention of urine. Usually small.

Persons who labour under this form of the disease, sometimes pass the smaller of the calculi whilst making water; but the larger still remain, producing retention of urine, and the operation of lithotomy has often been performed for them; but, as the following cases will prove, they may be extracted from the bladder by means which do not expose the patient to any loss of blood, do not occasion the slightest danger, or any very considerable degree of suffering. Sometimes passed with the urine.

I am fully aware of the impossibility of extracting large urinary calculi by the means which are here recommended; yet I cannot but feel a hope that they may be removed, in the early stages of the disease, by the following means, before they acquire a bulk too large to pass by the urethra.

In the infant also, it will be extremely difficult to contrive an instrument of sufficient delicacy to be introduced into the bladder through the urethra, which shall possess such a degree of strength as to enable it to grasp the stone firmly, and to extract it with safety.

* These observations and cases have been already published in the Medico-Chirurgical Transactions, vols. xi. and xii.

Instrument for extracting small stones.

The instrument which I first had made for the purpose of removing these calculi, was merely a common pair of forceps, made of the size of a sound, and similarly curved; but Mr. Weiss, surgeons' instrument maker, in the Strand, showed me a pair of bullet forceps, which he thought would, with a little alteration, better answer the purpose I had in view. He removed two of the blades of these forceps (for there were four), and gave them the form of the instrument which I had constructed; the blades of this instrument could be opened whilst in the bladder, by means of a stilette, so as to grasp and confine the stone; it gave but little pain on its introduction, but when opened to its greatest extent, and stones were admitted between its blades, their removal was painful, more particularly at the glans penis, which appears to be the portion of the urethra furnishing the greatest resistance to their removal.

I shall now proceed to detail the circumstances of the first case, as they have been related by the patient himself.

Case, as related by the Rev. Mr. Bullen.

The Rev. John Bullen, of Barnwell, near Cambridge, aged sixty-four, of a spare habit of body, and of a sanguine temperament, having enjoyed an uninterrupted state of good health, capable of partaking largely of the amusement of hunting, and living always with great moderation, was attacked, in May, 1818, with symptoms, of which he gives the following account:

"I was suddenly seized with a frequent inclination to pass my water, and an uneasy sensation along the course of the urethra, which continued with greater or less violence for about a fortnight, when I was surprised by the appearance of a small round white stone at the orifice of the passage. The escape of this small calculus, which was attended with scarcely any pain, failed to produce any beneficial effect on my former symptoms, which continued unabated, both as to the degree of irritation, and the frequency of making water. In this state I remained till June following, during which

month several similar calculi passed, to the number of about thirty, producing no other inconvenience than a slight smarting pain along the urethra. At the end of June, without any assignable cause, I was suddenly relieved from this discharge of calculous matter, and from every other symptom but that of a frequent desire to void my urine, which latter inconvenience occasioned me no feelings of anxiety or apprehension.

" In the ensuing winter I was seized with pains across the back and loins; for which Mr. Brewster, of Cambridge, supposing they proceeded from gravel, ordered me medicines, which he considered likely to alleviate them, but without producing any permanent good effect.

" I was, however, still enabled to pursue my favourite amusement of hunting, though frequently obliged to dismount to make water; at this time making no alteration from my accustomed mode of living.

" Without any material change, I remained until the December of 1819, when I found the exercise of riding was becoming considerably more painful, and the inclination to pass my water more frequent, attended with some degree of difficulty in its passage, and a change from its usual colour and clearness to a fluid resembling chocolate. For these symptoms several formulæ of medicines having been prescribed without any material benefit, I was induced to consult Mr. Abbott, a most respectable surgeon, at Cambridge, who ordered me medicines highly beneficial in their first effects; the relief, however, they afforded me was but of short duration, for my symptoms recurred with all their former violence; and though the prescriptions were repeatedly altered at Mr. Abbott's suggestion, no sensible impression could, by the most judicious treatment, be made on the disease.

" My friend, Dr. Thackeray, of Cambridge, was, in the June following, called in consultation with Mr. Abbott; and both agreeing that the symptoms were produced by stone in the bladder, the sound was introduced to ascertain its presence, but failed to discover it. My symptoms continuing unabated, Mr. Abbott, a

fortnight afterwards, still impressed with the idea of stone, again sounded me; but the stones, for the reasons hereafter given, escaped detection. To relieve my frequent inclination to make water, and to mitigate the pain I experienced in its discharge, I was recommended the use of an opiate glyster at bed-time, which afforded me considerable relief; but if the injection were omitted but for a single night, the symptoms returned with all their former violence.

"In this state of suffering I determined to consult Mr. Astley Cooper, and on the 17th of August went to town for that purpose. Mr. Cooper, suspecting from my account, that a stone was present in the bladder, sounded me; but after searching for some minutes was unable to detect one; he then directed me to discharge the water from my bladder, and the sound being again introduced was distinctly heard to strike upon a stone. He then informed me that there was no hopes of permanent relief but from the operation of lithotomy; at the same time remarking that, as I had not been sufficiently reduced by the irritation of the disease to render me a favourable subject for the operation, it would be better for me to return to Cambridge, and by pursuing a certain plan of diet and regimen, to reduce the high health which I appeared to possess. He also prescribed alkaline medicine, for the purpose of lessening irritation. With this advice I returned home, where I remained till October, 1820, pursuing the use of the soda and the opiate injection. My sufferings being alleviated only for the moment, and seeing no probability of experiencing further relief from medicine, on the 23rd of October I came to London to submit myself to the operation, and the 30th was the day proposed for its performance.

"On the day appointed, Mr. Cooper, his nephew, Mr. B. Cooper, and Mr. Merriman, jun. attended at my house. Upon sounding me, the instrument could be distinctly heard by every person present, and even by myself, to strike against a stone. Mr. Cooper, however, was of opinion that the stone was so small, as to admit of extraction without cutting into the bladder; and, therefore determined not to perform the operation, but told me that

he would try less dangerous means to rid me of this complaint; and, happily, under these circumstances, the operation was deferred.

"On the 3rd of November, I called at Mr. Cooper's house, when he passed a full-sized bougie into the bladder, for the purpose as he said, of dilating the urethra, and thus giving the stone an opportunity of passing with the flow of urine. This operation was repeated on the 6th, 10th, and 13th of November; but on the 14th an inflammation took place in the prostate gland, from the introduction of the bougies, and put a stop to the prosecution of this plan of treatment. The effect of this inflammation was a retention of urine, rendering it necessary for Mr. Cooper to draw off my water every twenty-four hours; at which time the calculus could always be distinctly felt by the catheter. After the inflammation had subsided, the power of making water not having returned, Mr. Cooper passed an elastic catheter into my bladder, and directed me to wear it; teaching me, at the same time, how to withdraw it when it became either painful or obstructed; and, on several occasions, I discovered small white stones in the opening of the instrument, similar to those which had passed in 1818. Mr. Cooper, upon being acquainted with this circumstance, expressed a wish to remove the instrument himself; when, upon withdrawing it, a stone was seen large enough to fill the opening in the side of the elastic catheter. The passage of these calculi suggested to Mr. Cooper the possibility of inventing an instrument, by which he might remove those that remained in the bladder; and on the 23rd of November he brought with him some instruments contrived for the purpose; one of which he directly employed, and was so fortunate in the first trial as to remove eight calculi of small size. The operation was productive of a very inconsiderable degree of pain.

"On the 28th, eight more were removed by the same means, of a larger size than the former, two being as big as horse-beans. This operation was attended with even less pain than the former.

"On the 30th, eleven were extracted; three or four being engaged each time the instrument was withdrawn. The removal

of these gave me great relief, for I was immediately enabled to pass a considerable quantity of urine by my natural efforts; and previously to this, ever since the large bougie had been introduced, I had been unable to pass my water without the aid of the catheter.

"On the 8th of December, six stones were removed by the same means.

"On the 13th, nine more were taken away.

"On the 19th, three more were extracted.

"On the 23rd, twelve more were removed; thus only allowing the intermission of a day or two for the irritation to go off. The operations were repeated until eighty-four calculi were, by these means, extracted from my bladder; when Mr. Cooper pronounced, after a most careful examination, they were all removed. My health has been all this time uninterruptedly good with the exception of the attack of retention of urine from the use of the large bougie; and I am now able to discharge my urine without the use of the catheter, and to walk nearly as well as ever I did."

The following case is, in part, detailed from the patient's account of his symptoms; and, in part, from the statement of Sir Gilbert Blane, who is the patient's physician.

Sir William Bellingham's Account of his Case.

"Sir William B——— is in his sixty-seventh year; he suffered much at times from long and severe attacks of the gout, from about his thirty-fifth to his sixtieth year; since which period the attacks have been much less frequent, much mitigated, and of short continuance. He thinks he first perceived red gravel, or sand, to come from him occasionally, soon after a long fit of the gout, about seven or eight years since, but did not suffer much inconvenience from it. About four years since he passed pieces of gravel at different times, and has continued occasionally to do so ever since; sometimes larger than a pea, but generally of an oblong shape. When they occasioned any stoppage in the passage, he used a hot bath at 94°, and drank plentifully of some diluting drink, which,

after a little time relieved him. In the summer of the year 1820, having had occasion to use a great deal of walking exercise in London, for three or four days he was much surprised on passing, first, a considerable quantity of very dark stuff, nearly like coffee-grounds; and afterwards a considerable quantity of what appeared chiefly blood. He did not experience any pain of consequence with this; and by the following day his urine was as clear as before. Upon going into the country, he found that if he rode fast at any time, it brought on the passing of the dark stuff, and afterwards, if persisted in, of blood. By degrees he gave up riding, and finally ceased to ride about Christmas last; and finding the same effects to arise, in a slighter degree, from walking much, he has very nearly given up that also, for the last six months. Sir Astley Cooper and Sir Gilbert Blane attended him for these symptoms, in June and July, 1821, when he left London for Ireland; whilst there, he continued to experience the same inconvenience as before, with but little pain, and the same on his return to London. Early in June last, he called on Sir Astley Cooper to say he was going again to Ireland, and wished to have some conversation with him, when Sir Astley advised his being sounded; which he then was, and it was ascertained that there was a stone. As it appeared to Sir Astley Cooper to be a small one, he proposed trying to extract it; and on the fourth trial, with intervals of a week or so between them, a stone weighing seventeen grains and a half was extracted on the 18th of July. About three weeks after, Sir William, having some fears that there still remained some stone behind, again applied to Sir Astley Cooper, who, upon sounding, found that such was the case; and on making at that time, at his house, an attempt to extract, he brought it part of the way, but found it too large to bring forward, and therefore returned it; and, as soon after as the parts would permit, he commenced enlarging the passage by bougies, which he continued at intervals for nearly a fortnight, and then extracted a stone weighing fifty-four grains, on the 28th of August, 1822."

Sir William B. suffered pain in making water; swelling of the

corpus spongiosum at the scrotum, with considerable urethral discharge, until September 23rd, when the symptoms subsided, under the application of fomentations and poultices.

When the size of the stone is observed, it will not excite surprise that I had considerable difficulty in extracting the larger, which weighed fifty-four grains. It was in that part of the urethra near the glans that the chief impediment was found; and, if I had thought proper to do so, I could have easily removed it from thence by incision, but I preferred completing the extraction without occasioning a wound. Yet I am now disposed to believe that, in a stone of equal magnitude, it would be better to make a small incision into the urethra, anteriorly to the scrotum, than employ force for the extraction of the stone through this narrower part of the urethra. A. C.

Mr. King's Case.

Mr. William King, aged sixty-six, mariner, residing at Rochester, was sent to me by Mr. Newsom, surgeon, of Rochester, on account of his having symptoms of the stone.

He came to London on the 29th of October, 1822, and on the 30th he visited me. I sounded him, and found that he had, as Mr. Newsom supposed, calculi in the bladder. I passed the urethral forceps into the bladder, and in a few minutes extracted four calculi; and although I could still perceive that some remained in the bladder, I did not choose to risk the production of any considerable degree of irritation; but advised him to come on November 1st, to have the operation repeated.

On the 1st of November I extracted three calculi; on the 4th, five more; on the 7th, twelve calculi; on the 11th two; and on the 13th, three more. I then examined the bladder with care, but could not perceive any more stones; and, even before the removal of the last, he had experienced considerable diminution of the pain in making water, and of the difficulty in passing it.

It is delightful to hear the expressions of gratitude which this

patient pours forth for the relief which he has experienced from these operations, under which he has suffered but a slight degree of pain, and has never for a moment been confined from whatever exercise he was disposed to take.

Some years ago he passed red sand (uric acid); but for several months before he had symptoms of the stone, he had not perceived any.

I have lately removed from a young person (a patient of Mr. Rutherford, in Ratcliffe Highway), of the name of Errington, a calculus of moderate size, and enabled two others to pass, by withdrawing the instrument in its dilated state, and thus extended the urethra, in such a degree, that the stones passed in the afternoon of the same day in a copious discharge of the urine. Case.

I have heard that it has been stated, that there was no novelty either in this idea or in the instrument. To this I have only to observe, that if the idea had previously occurred to any individual, he had so far buried it in his bosom that I had never heard of it; and, as to the instrument, I am quite sure that Mr. Weiss consulted no musty volume for its formation; for, so soon as I mentioned my wish, that he should construct a pair of forceps by dividing a sound in its middle, and giving it a joint two inches from its end, he, without quitting me, observed that he should make them to open, in the mode in which he now makes them. Mr. Weiss has a strong and ingenious mind, and does not use petty artifices to obtain employment or character. But let us for a moment suppose (what I do not believe) that the idea had occurred to others, and the instrument had been made centuries ago, what are we to say of the apathy of those bright ornaments of their profession, Cheselden, Pott, Hunter, Cline, Home, Blizard, &c. who, if they had heard of such an instrument, had never employed it.

OF BREAKING OR SAWING STONES IN THE BLADDER.

An instrument for the purpose of breaking stones in the bladder

(called lithontripteur) has been invented; and, during the last year, successfully employed in Paris, by Mons. Civiale.

A description of the instrument, of the mode of using it, and an account of three cases in which it has succeeded, have been published from a Report of the Royal Academy of Sciences.

The size and straight form of the lithontripteur render it only applicable to peculiar cases. The urethra must have acquired its full growth, and the prostate gland must be in a healthy state, or the instrument cannot be employed with safety: even then the urethra must, in most cases, be gradually dilated by the passage of bougies, before the operation can be performed. When introduced into the bladder, the lithontripteur is not calculated to seize a large stone, as the claws or holders do not separate to a sufficient width to grasp it, which cannot be remedied unless the size of the instrument be increased, or the springs weakened.

The lithontripteur is therefore only adapted to the case of an adult, having a sound state of urethra and prostate, provided the calculus be also of a moderate size.

This instrument has not yet been successfully employed in this country.

Mr. Weiss, whose name I have already had occasion to mention, has made an instrument, which is well calculated to break stones of small size, and of not very hard consistence: it is on the same plan as the urethro-vesical forceps, but having strong springs. He is now engaged in perfecting an instrument, which will divide a stone into minute pieces by means of a saw.

OF CALCULI IN THE URETHRA.

They may be best described in the three situations in which the surgeon is called upon to aid their passage, or to remove them by operation; viz. first, in the membranous part of the urethra; secondly, above the scrotum; thirdly, opposite the frænum.

In the membranous part.

If you are consulted on account of a stone being arrested in its progress at the membranous portion of the canal, you find the

patient having the strongest desire to void his urine; but able only to pass a few drops, with dreadful agony. You introduce a catheter to the membranous part of the urethra, and, feeling a stone grate against its extremity, you should immediately withdraw it, and pass a bougie as large as the passage will admit; when this touches the stone it should be left in, and the patient should be directed to sit in water as hot as he can bear it, and continue it as long as he can: at the same time he should take opium with small doses of tartarized antimony. In half an hour, or an hour, withdraw the bougie, whilst the patient tries to make water, when the stone will frequently follow the bougie, being forced from him by the *vis-a-tergo*. I have found this plan to be the most successful.

Operation to extract the calculus.

If the stone permanently lodges in the membranous portion of the urethra, pass a catheter down to it, and introduce a finger into the rectum, to press upon the canal behind the stone, so as to prevent any retrograde movement of it towards the bladder; then make an incision in perineo upon the calculus, and extract it with the common dressing forceps.

Stone behind the scrotum.

If the stone be placed in the urethra above the scrotum, try to press it forwards with the fingers, until it be brought before the scrotum; if this cannot be effected, it must be pushed back behind the scrotum, and there cut upon, if the use of the large bougie, as in the former case, is not successful.

Scrotum must not be opened.

Do not cut through the scrotum to remove a calculus until all other means have been tried; and if it be at all necessary, which I doubt, let the external opening be free, so as to allow of a ready escape for the urine, aud thereby prevent its extravasation into the cellular tissue, which would produce extensive inflammation and suppuration. A catheter should be introduced into the bladder after the operation, and left there, that the urine may flow through it during the time the wound is healing.

Stone near the glans.

If the stone be situated near the glans, the surgeon should try to press it through the meatus; but, if he cannot accomplish this, he should introduce a common probe, curved at its end, behind the stone, and draw it forwards.

Forceps cannot be introduced effectually, because they open in the urethra before the stone, but cannot be passed over it.

Meatus to be enlarged.

It is better to enlarge the meatus with a lancet, to free the passage of the stone, rather than risk the laceration of the parts from violence.

Preparations in the Museum at St. Thomas's Hospital.

In the collection at St. Thomas's Hospital I have two preparations, showing calculi which have ulcerated their way into the urethra. One, a stone of the form and size of the little finger, and slightly curved, which I cut from a young man who had a fistula in perineo: with a probe I felt the end of a calculus through the fistulous opening, and therefore made an incision and extracted it; its anterior extremity was in the membranous portion of the urethra, its posterior in the bladder. In the other preparation, the stones are seen partly in the prostatic part of the urethra, passing there by ulceration. I have twice known a stone in the urethra destroy life by occasioning an extravasation of urine into the scrotum.

LECTURE XXXII.

OF CALCULI IN THE PROSTATE GLAND.

I SEPARATE these from urinary calculi, because they are formed independent of that secretion, and they differ generally in their component materials from urinary calculi.

Found in two situations.

I have found them in two situations in the prostate: first, several calculi, each seated in a separate small duct; secondly, numerous calculi placed together in a cyst or bag in the substance of the gland.

Do not acquire a large size.

They rarely acquire any considerable size; the largest I have seen not being bigger than a pea, and they seldom are so large; but their numbers are sometimes very considerable.

Case.

I was called by Mr. George Vaux, to see a Mr. Lewis, in the Old Jewry, who had retention of urine, and in whom there was

difficulty in passing the catheter. As the instrument entered the bladder through the prostate gland, it grated over a stone. I passed my finger per rectum, and felt two or three calculi grating against each other, and I endeavoured to persuade him to let me extract them, but he would not consent. He died of diseased kidneys, and I have his prostate gland, containing the calculi, in the collection at St. Thomas's Hospital.

The second case was that of General B——, whom I cut for the stone in his bladder: I removed many calculi, some of which were prostatic and some urinary. The surgeon, who had attended the General previously, had observed that a bougie, which he had introduced into the bladder, was marked by the calculi. The patient recovered. Case.

I operated on a patient of Mr. Forbes, surgeon, at Camberwell, and removed an immense number of prostatic calculi. These calculi had produced not only painful feelings in the perineum, but a degree of irritation, which kept the patient in continued mental excitement, bordering upon insanity. I introduced a staff into the bladder through the urethra, and opened the perineum as far as the prostate, cutting into the urethra, as in the operation for lithotomy; I then made an incision into the left lateral lobe, and extracted many calculi from a bag formed in it. The patient bore the operation well, but did not perfectly recover; a fistulous opening remained, and his symptoms became as distressing as before. On examining by the fistulous opening, I could distinctly feel more calculi, although I could not discover them by introducing my finger per rectum. The sufferings of the patient induced me, about six months after the first operation, to perform a second, which I accomplished by passing a director into the fistulous opening, and then enlarging this opening by a bistory; I extracted about half as many calculi as in the first operation. The patient soon recovered from the effects of this second operation, and the wound closed entirely; but, after a short time, his sufferings became as dreadful as before, and, believing that he could not procure any relief, he destroyed himself six months after the second operation. Case.

A lady in using a catheter for herself, broke it in the bladder, and I extracted it in the presence of Mr. Ilott, of Bromley.

I have known women introduce extraneous substances into the vagina, to invite the operation for the stone.

A girl, about twenty years of age, came to St. Thomas's Hospital, describing herself to suffer all the symptoms of the stone; she was placed upon the operating table, before all the students, and Mr. Cline passed a sound to ascertain the presence of the stone; he struck some solid body, and a person of less caution might have immediately proceeded with the operation; but he said, "I feel a solid body, which has not the hardness of stone;" he then examined by the vagina, and drew from thence a portion of coal, and afterwards several other pieces: she had no disease. Case.

I cut a woman in Guy's Hospital for the stone, and found a large piece of a brass nail in her bladder, which is now in the collection at St. Thomas's Hospital. Case.

In the female, a stone will form around an extraneous body, as in the male, of which the following is a curious instance:—a woman was the subject of retention of urine, and required the frequent introduction of the catheter: she was under the care of Mr. Castle, surgeon at Sittingbourne; and one of his assistants having passed the catheter, allowed it to escape from his fingers into the bladder, and there it remained for several months: she was then sent to Guy's Hospital, where I sounded her and felt the catheter. I opened the urethra freely with a knife, and passing my finger into the bladder, found the catheter placed transversely in it, and on its centre a large calculus with each end free from such accumulation. I then brought down one end of the catheter to the meatus, with my finger, and thus removed it. The calculus deposit on the instrument weighed at least an ounce. Stone formed on an extraneous body. Case.

Very large calculi can pass by the meatus. Mr. Giraud gave one of more than an ounce weight, which a woman had passed with her urine. Large stones may pass the urethra.

The same medical treatment is proper in the female as has been recommended in the male, to lessen the patient's sufferings. It Medical treatment.

might be thought that solvents could with advantage be injected, but the patients cannot bear them, and will not submit to their use, as they irritate excessively. Opium may be injected, or a suppository be introduced; but they only relieve for a very short period.

Calculi extracted without cutting.

Stones of large size may be extracted from the female without the use of cutting instruments. Mr. Thomas has related, in the Medico-Chirurgical Transactions, a case in which he dilated the meatus urinarius to extract an extraneous body from the bladder. Guided by this circumstance, I removed a calculus, having, by the use of sponge tent, dilated the meatus; and in another case, by the dilating forceps, I took away a portion of a catheter.

Case.

Dr. Nuttall and myself attending a case together, he objected to my mode of dilating the meatus, and thought that forceps with blades opening in parallel instead of divergent lines would be better. We walked together to Mr. Weiss, who, with his usual ingenuity, made a forceps upon that principle.

Unless a stone be extremely large, it should be removed by dilatation of the urethra, which may, by a speculum or pair of forceps, be opened sufficiently in a few minutes for this purpose. The advantage attending this mode of extracting a stone is, that the passage again contracts, and the urine is afterwards retained.

In the first case in which I performed this operation in Guy's Hospital, having used sponge tent, the patient perfectly recovered in a very few days.

Mode of operating with the knife.

If the operation for lithotomy be required in the female, it should be performed in the following manner:—the patient having been bound in the same position as in the operation on the male; the sound is to be introduced (and it may be sometimes necessary to use a curved male sound, which Mr. Cline used to recommend,) in order to detect the calculus.

The stone being found, a straight staff is to be introduced when the sound has been withdrawn; and this the surgeon should hold in his left hand, with the groove turned to the left branch of the

ischium: the beak of the straight bistory is then to be passed along its groove into the bladder, so as to divide the meatus and urethra obliquely downwards and outwards on the left side, between the vagina and branch of the ischium. The finger may then be passed into the bladder, to ascertain the situation of the stone, after which the forceps are to be introduced and the stone extracted. The curved forceps are sometimes necessary on account of the capacity of the bladder, and the usual position of the calculus, which rests behind the neck of the bladder, over the posterior and upper part of the vagina.

A large stone is with difficulty extracted from the female, on account of the proximity of the meatus and pubes. Large stones difficult to extract.

In all cases of this operation which I have performed or witnessed, the urine has not been afterwards retained; but I would not deny that a patient might recover the retentive power. Operation causes incontinence.

As the loss of retention is a greater evil than I can describe, producing excoriation, and a very offensive state, I shall, in any future operation of lithotomy, try what may be effected by employing a suture to bring the divided parts together.

ON CALCULI IN THE SUBMAXILLARY DUCT.

Stones forming in this duct produce considerable inconvenience, and the cause of the symptoms generally exists for some time before it is discovered. Produce inconvenience.

When I was living with Mr. Cline, he used frequently to say, "I have a spasm in my mylo-hyoideus muscle," and it was usually at the time of eating that he made this observation: at length he said, "I have discovered the cause of the uneasiness and spasm under my tongue, it arises from a stone in the submaxillary duct," which he desired me to feel, and which I removed from him in the manner I shall presently describe. Case.

A medical man called upon me and said, "I have an irritation and swelling under my tongue; I have taken great quantities of blue pill; but as my health has become impaired, and the disease Case.

continues, I am advised to go to the coast." On putting my finger under his tongue, I felt a calculus, which I immediately removed, and in a week he was well.

Situation. These calculi are generally situated in the trunk of the duct, but sometimes in its branches within the substance of the gland.

Size. The largest I have seen was of the size of an almond deprived of its shell; I have seen one fluted so as to allow of the passage of the saliva through the depression.

Composition. They are composed of phosphate of lime.

Operation to extract them. The operation for their removal is to be performed as follows:—the cheek is drawn back by means of a blunt hook introduced at the angle of the mouth; the duct is pressed upwards by the finger of an assistant, placed under the lower jaw: an incision is then made, with a pointed and curved bistory, upon the stone from under the tongue, within the mouth, so as to divide the lining membrane of the mouth and open the submaxillary duct; the stone being exposed, is to be brought from its situation by means of a small hook which is to be passed under it. If the stone be deep seated in the substance of the gland, a small pair of forceps are required to extract it.

LECTURE XXXIII.

OPERATIONS FOR RETENTION OF URINE.

It is not my intention, in the present Lecture, to enter into a detailed description of the causes which give rise to the retention of urine; but merely here to state them generally, and at a future time give a more particular account of each.

Causes. The causes which I have known produce retention of urine in the male are:

1. A narrow orifice to the urethra.
2. A congenital obstruction in the urethra.
3. Permanent stricture.

4. Inflammatory stricture.
5. Spasmodic stricture.
6. Abscess or tumour pressing upon the urethra.
7. Stone in the urethra.
8. An enlargement of the prostate gland.
9. Paralysis of the bladder.
10. Chancres or other ulcers in the urethra, which in healing close it.

In the female:

1. Polypus of the vagina.
2. Polypus of the uterus.
3. Ovarian enlargement.
4. Retroversion of the uterus.
5. Loss of power from uterine affection, a species of hysteria.

Consequences.

From whatever cause the retention be produced, the bladder must be relieved of its load, or the patient will die from inflammation or gangrene, or perish from irritation.

An operation necessary.

If, therefore, a catheter cannot be introduced; if relaxation by bleeding, the warm bath, and antimony; if lulling the patient by opium, do not succeed in giving a passage to the water, an operation will be required to save the patient.

Symptoms.

Besides the dreadful pain and excessive irritation occasioned by the distention of the bladder, retention of urine is marked by a frequent urgency to make water, and swelling of the lower part of the abdomen, from the accumulation in the bladder; this swelling reaches as high as the navel, and on each side to the lineæ semilunares: the fluid accumulation can be distinctly felt through the abdominal parietes.

Operation.

The mode of relief which has been usually resorted to has been to puncture the bladder: but, in the male, it is not the operation which I perform, nor do I recommend it as a general practice; but as it may be occasionally required, I shall describe the different modes of puncture.

Founded on anatomical knowledge.

The operations of puncturing the bladder are founded upon a knowledge of the reflexion of the peritoneum, which passes from

the abdominal parietes above the pubes to the fundus of the bladder; and is continued to the back of the bladder, near to the prostate gland, and is then reflected to the fore part of the rectum.

Thus the cervix of the bladder and its fore part above and behind the pubes, also the posterior and inferior part behind the prostate gland as far as the entrance of the ureters, are devoid of peritoneal covering.

OF THE PUNCTURE ABOVE THE PUBES.

When the bladder becomes excessively distended, its fundus rises towards the umbilicus, and carries with it the peritoneum, so that a considerable space is left above the pubes uncovered by this membrane, at which place a trocar may be easily introduced, without danger of wounding it.

This space is covered by the linea alba, in the centre, and at the sides by the pyramidales and recti muscles, the bladder being attached beneath by cellular tissue.

Operation.

The operation requires the following attentions.

First, The patient is to be placed on a table, in the horizontal position, with his knees a little elevated.

Secondly, The hair is to be removed from the pubes.

Thirdly, An incision, one inch in length, is to be made through the integument immediately above the pubes, in the direction of the linea alba.

Fourthly, A trocar and canula, of sufficient length, are passed through the opening in the skin, and then thrust through the linea alba, cellular tissue, and fore part of the bladder into its cavity.

Fifthly, The direction of the trocar should be to the basis of the sacrum, that is, a little upwards, and not directly downwards in a perpendicular line, as it may then pass between the bladder and pubes; and even if the instrument enters the bladder, as the organ contracts it slips from the canula.

Sixthly, The trocar is to be withdrawn to allow the urine to escape through the canula.

Seventhly, A male flexible catheter is to be passed through the canula, cut to a proper length, so as to remain in the bladder, and is to be secured so as to prevent its escape.

This operation is easy of performance, requiring little anatomical knowledge, and has therefore usually had the preference given to it.

When the inflammation following the operation has subsided, when all danger from extravasation of urine into the cellular membrane has ceased, and the patient recovers his health, it is right to begin attempts to re-establish the urethra by the use of bougies, sounds, &c. and this may be generally effected. After-treatment.

I saw a man from Essex, below Malden, whose bladder had been successfully punctured by Dr. Hare, above the pubes, twelve months before, and who came to town to consult me, with a female catheter still remaining in the bladder, in the same opening at which the urine had been drawn off. I, after a time, succeeded in passing a catheter into his bladder through the urethra, the female catheter was removed, and he returned into the country with the wound above the pubes quite closed. Case.

An objection to this operation, formerly urged, was, that the canula remaining in the bladder produced irritation: this is obviated by the use of an elastic gum catheter, instead of the metallic one. Objection to the operation.

OF PUNCTURING THE BLADDER BY THE RECTUM.

When the bladder is greatly distended, and has not undergone any morbid change, it generally projects into the rectum; so that if the finger be introduced into the gut, a fluctuating swelling is felt just beyond the seat of the prostate gland. Bladder forms a projection into the rectum.

When the prostate gland is enlarged, this part of the bladder is more remote from the anus and less accessible, although still within reach.

Behind the prostate gland is a triangular space, bounded in the following manner:—on each side by the vasa deferentia and vesiculæ seminales meeting at the prostate; and the peritoneum is the boundary behind. In the centre of this space a trocar and Part to be punctured.

canula may be passed through the fore part of the rectum, through the cellular tissue connecting it to the bladder, and through the coats of the latter into its cavity.

If the centre of the space be kept, there is no danger of wounding the vasa deferentia or vesiculæ seminales if the bladder be distended. The trocar may be safely introduced an inch behind the prostate without risk of injuring the peritoneum, and the vasa deferentia may be thus completely avoided, whereas a puncture near the gland might endanger them.

Operation.

The operation is to be thus performed:

First, The patient is to be placed on a high table, so that the surgeon can sit lower than the patient.

Secondly, The finger is to be passed per rectum to the projecting portion of the bladder behind the prostate.

Thirdly, A trocar and canula, three inches long, are to be passed upon the finger to the protruding part of the bladder, and forced through the fore part of the rectum and posterior part of the bladder into its cavity. A curved trocar has been advised and employed, but it is quite unnecessary if the silver canula be not suffered to remain.

Fourthly, The trocar is to be withdrawn, and a flexible gum catheter is to be passed through the canula into the bladder; the canula is then to be removed, and the elastic catheter to be confined to a T bandage, or to a tape passed between the thighs.

After-treatment.

When the patient has sufficiently recovered from the inflammation which the disease and operation have produced, it will be right to begin with re-establishing the urethra.

This operation is easily performed; but it is decidedly objectionable, on account of the urine being liable to produce a diseased state of the rectum.

Dr. Cheston, of Gloucester, told me that he had seen great disease of the intestine occasioned by it.

I was sent for to a patient who had undergone this operation for retention of urine from a disease of the prostate gland. The bladder had been punctured just before my arrival, yet I easily passed a

catheter into his bladder through the urethra. I mention this to show how little the operation was required, and that the enlarged gland did not prevent the introduction of the catheter.

OF THE OPERATION IN PERINEO.

The neck of the bladder around the prostate gland is devoid of peritoneum; and, excepting the posterior surface, where the vasa deferentia and vesiculæ seminales are seated, there is no important part which can be injured by a puncture.

Requires anatomical knowledge.

This operation requires more anatomical knowledge than the two which I have described; it is more difficult to perform, and much more care is required to preserve the opening into the bladder, yet, to a scientific surgeon even this presents but little difficulty. Mr. Cline used always to advocate its performance.

Operation.

The steps of the operation are as follow:

First, An incision is to be made in perineo, as in the operation for the stone, and it is to be carried to the bulb of the urethra, where it is covered by the accelerator urinæ.

Secondly, The bulb is to be pressed by the finger to the patient's right side, and the incision is then carried onwards between the bulb and left crus of the penis, as far as the prostate gland.

Thirdly, The surgeon is to pass his finger into the wound as far as the left side of the prostate gland, so that it may serve as a guide to the canula and trocar.

Fourthly, The trocar and canula are to be pushed into the cavity of the bladder, by the left side of the gland.

Fifthly, The trocar being withdrawn, the canula is left in the bladder to allow of the escape of the urine.

Sixthly, Through the canula an elastic gum catheter is to be passed and secured, as in the former case.

Subsequent treatment.

When the patient has recovered sufficiently, the natural canal is to be opened by the use of a sound or bougie; and in all cases of considerable difficulty, when the urine passes freely by the artificial opening, a caustic may be safely employed.

Other modes of relief.

Having described the different operations which are performed for the relief of a patient having retention of urine, I shall now proceed to point out the practice which I have myself pursued in these cases.

Most frequent causes of retention.

I must premise, that I consider, from the experience that I have had in this disease, that nine tenths of the difficulties in passing the urine arises from strictures of the urethra, or from enlargement of the prostate gland: with respect to the latter, I have never yet seen a case in which I could not pass a catheter, made of proper form and size, although I do not wish to be understood to say, that there never can be such a case; but only, that in the course of a very extended experience I have never found an instance of it. I shall say more upon this subject when I speak of the diseases of the prostate gland; but shall now return to describe the mode of relieving retention from diseases of the urethra.

Preferable operation.

The operation which I prefer is, to open the urethra only, and not to puncture the bladder, which I hold, in the male, to be scarcely ever necessary.

Case.

One night, when giving the surgical lecture at St. Thomas's Hospital, a dresser of Mr. Chandler's, then surgeon to the Hospital, came into the Theatre to inform me that a patient was labouring under retention of urine from the use of a caustic bougie; that the man was in great pain, and that a catheter could not be made to pass the stricture. I said "I will go with you into the ward after lecture, and do what is necessary." The pupils accompanied me. Upon examination of the man, I found that the stricture was seated in that portion of the urethra which was covered by the scrotum. I tried to pass different instruments, but could not succeed.

Reflecting on the case, it appeared to me to be exposing the patient to unnecessary pain and danger if I punctured his distended bladder; as, when I directed him to make attempts to discharge his urine, the urethra swelled excessively behind the stricture, from the urine passing as far as its seat. I therefore determined to make an incision into the urethra only, which I immediately did, being directed to the place by the distention which an attempt to void the

urine produced. The urethra was opened behind the scrotum, and the urine readily discharged. The patient rapidly recovered without any bad symptom.

I was also induced to act as I have described, by the following case. I was sent for early one morning to visit a patient with retention of urine, who had a cicatrix at the extremity of the urethra, from a chancre; for some time the urine had passed in a great degree by drops; and when in a stream, in one not larger than a hair. When I saw him, the urgency to make water was excessive, but not a drop would pass, yet I found that it distended the urethra as far as opposite to the situation of the frænum. I therefore immediately passed a lancet through the cicatrix in the usual seat of the meatus, and so soon as I penetrated the glans the urine rushed by the sides of the lancet. Case.

Mr. Robert Pugh, of Gracechurch Street, sent to me to visit a patient of his who had a retention of urine from stricture in the urethra, which no instrument would pass. Upon directing him to try to micturate, the urethra could be felt to swell behind the stricture, and I passed a lancet into it behind the obstruction. The urine directly flowed through the opening. Case.

I now never open the bladder, but merely do as I have above described; and I am happy to say, that some of my surgical friends, at our Hospitals, have repeatedly adopted the same plan, and successfully.

I sometimes introduce a female catheter into the urethra through the wound, to prevent extravasation and to permit the easy passage of the urine, but this is not absolutely necessary.

This operation has been objected to, on the supposition that it requires great anatomical knowledge, and is very difficult to perform:—to the first objection I will say, that he who is adverse to an operation because it requires anatomical knowledge, should immediately give up his profession; for if surgery be not founded upon an accurate knowledge of anatomy, it will be better for mankind that there should be no surgery, as disease will proceed better with the natural means of relief, than with the aid of those surgeons who are not anatomists. Objections to the operation

Difficulty obviated.

With respect to the difficulty of the operation, I would say to him who finds any, pass a catheter or staff, to the stricture, and, directed by its point in making the incision, carry it an inch behind, and in a line with the point of such director, and the difficulty will vanish.

The state of the urethra in stricture is very different to that which exists with fistula in perineo: in the former case it is large behind the obstruction, in the latter it is contracted and very difficult to find.

Little danger in this operation.

By the mode I have advised, the danger of retention of urine is almost entirely dissipated, for opening of the urethra will be rarely followed by fatal effects.

OF RETENTION OF URINE IN THE FEMALE.

Puncture rarely necessary.

The puncture of the bladder is rarely required in the female; and when it becomes necessary, the surgeon can hardly hesitate in his choice of the mode he shall adopt.

Different modes.

It might be performed through the vagina, or it might be executed by the side of the meatus between it and the branch of the pubes in some cases; but the former would probably cause a fistulous orifice, by which the urine would constantly irritate the vagina, and the latter would for some causes of retention be impracticable.

Above the pubes the best.

The operation above the pubes appears to be, in all respects, preferable to any other; the steps of it are the same as those in the male, and therefore there is no necessity for my again describing it.

OF AMPUTATION OF THE PENIS.

When necessary.

This operation is occasionally required for a cancerous state of the part.

Disease commences.

The disease, which renders the operation necessary, commences sometimes upon the prepuce and sometimes upon the glans.

In the prepuce.

First, When seated upon the prepuce, it begins on a pimple,

surrounded by a hard base; it ulcerates slowly and discharges a bloody serum, occasionally with a mixture of pus. At first, slight irritation only attends it; and, after a time, the patient experiences sharp darting pains. As the disease extends, a large portion of the prepuce participates in it; and if it be long suffered to proceed, a gland in one or both groins becomes affected. A phymosis is gradually produced, and a division of the skin must be made, to ascertain the exact nature and extent of the disease; and if the complaint be decidedly cancerous, it will be best to complete the operation at once, by cutting away the whole of the affected prepuce by a circular incision, and then securing the divided vessels. When the bleeding has ceased, a poultice should be applied, with which the wound heals better than by any other dressing.

Commencing in the glans.

Secondly, When the disease begins upon the glans penis, it usually makes its appearance in the form of a wart, attended with considerable irritation, and a discharge of serous fluid. The wart ulcerates, and the surrounding parts acquire a great degree of hardness and swelling. Other warts, of a similar nature, are produced, so that the ulcers become numerous: they also extend deeply, and phymosis is occasioned by the surrounding tumefaction. Great impediment arises to the passage of the urine, but at length apertures form from the urethra through the skin of the penis: the patient suffers from irritation of the raw surfaces by the urine, and the disease is accompanied with those lancinating and shooting pains, which usually attend cancerous affections.

If the prepuce be slit up, the whole glans is found swollen, and excessively hard; and the penis, from the number of its warty excrescences, and from their eversion, has somewhat the resemblance in its appearance to the cauliflower.

State of the corpus spongiosum.

The corpus spongiosum and the urethra are diseased nearer to the pubis than the glans, and the surgeon must examine with care the extent of the complaint in that direction.

Hæmorrhage.

Free hæmorrhage from the ulcerated surfaces occasionally occurs, the glands in the groin become enlarged, and sometimes several in each groin; and when this happens all hope from surgery has

vanished. The glands sometimes ulcerate and produce a very troublesome sore, with everted edges and irregular surface, a serous discharge, and sometimes free hæmorrhages.

Destruction of the penis.

The penis continues ulcerating until that part which is naturally pendulous becomes destroyed, occasioning retention of urine, and great difficulty in its discharge at other times. The urine passing in various directions excoriates the scrotum, and leads to a most painful but lingering termination of existence.

Frequent cause.

This disease is often the result of a natural phymosis, leading to a confined and irritating state of the secretions of the glandulæ odoriferæ; and, when the constitution becomes unhealthy, to the production of unnatural actions in the part.

Medicine of no service.

As to the treatment of this disease, nothing is to be done by medicine or applications, but to tranqullize the parts and to keep them clean.

Irritating applications prejudicial.

All irritating applications should be avoided. Poultices, ointments of bismuth, lead, chalk, opium, zinc, may be alternately employed, as that previously used loses its effect.

Arsenic.

Arsenic I have tried in these cases, but have never succeeded with it; on the contrary, it has greatly irritated and made the sore more extensive and the warts more numerous.

Removal.

The only means by which the effects of this dreadful malady can be averted, consist in the early removal of the diseased portions of the penis.

It is required, in doing this, that the surgeon proceed somewhat beyond the exact limits of the disease; more especially must he examine with care the urethra and corpus spongiosum, in which the complaint is usually most extensive.

The operation is dreadfully painful, but it lasts only for a moment.

Operation.

Its steps are as follow:

First, Draw forward and elongate the penis as much as is possible.

Secondly, Tie a piece of narrow tape tightly around the penis at the pubes.

Thirdly, Make a direct cut through the penis, behind the disease, without any attention to preserving the integuments to cover the corpora cavernosa and corpus spongiosum; for to do so is a great evil, by preventing a free escape of the urine.

Fourthly, Tie a tape tightly around the remaining part of the penis, and make pressure upon it, and there is no necessity for securing any blood vessel. After-treatment.

When the bleeding has stopped, remove the tape and apply lint upon the wound.

In a few hours, the necessity of micturating will remove the dressings; and when the danger of bleeding has ceased, a poultice should be applied as the best means of exciting granulation and of healing the sore.

When the surface begins to granulate, a piece of bougie, two inches long, is to be worn constantly in the urethra, to prevent its contraction, otherwise it gradually closes as the wound heals, and produces retention of urine. Introduction of bougie.

LECTURE XXXIV.

OF FISTULA IN ANO.

This is an abscess of the cellular membrane, near to the rectum, which produces an aperture into the rectum, or by the side of the anus. Definition.

If it be asked why this abscess is so much more difficult to heal than others, and why it frequently requires an operation; the answer is, that from its vicinity to the rectum, it is influenced by the action of the sphincter and levator ani; and that these muscles have a constant tendency to prevent the union of the granulations and coalescence of the sinus. It therefore rarely happens, but that the surgeon is required to assist nature in the restoration of the parts to a healthy state, by dividing the sphincter, and thus destroying its influence upon the sinus. Difficult to heal.

Symptoms.

The symptoms of this disease are, pain near the anus, with considerable hardness, bearing down, and tenesmus upon going to stool, and difficulty in the evacuation; throbbing and darting pain in the rectum, and on the diseased side of the nates. A fluctuation is perceived; and if the case be left to nature, the abscess breaks either into the rectum, and the matter and blood are discharged with the fæces, or it breaks externally near the anus, but sometimes at a distance from it, either in the perineum or in the nates. The matter which issues from the abscess is sometimes excessively putrid, extricating a considerable quantity of air, and is highly offensive.

Discharge of the matter.

The fistulous orifice, when it is formed into the rectum only, is the most difficult of management, because the orifice is with difficulty discerned. When the abscess breaks both externally and into the rectum, it is most easy of treatment; but it generally discharges itself only externally; and a probe, when introduced, passes to the side of the rectum, sometimes to the external surface of the intestine, at others from half an inch to an inch from it, so that the original seat of the matter is in the cellular tissue surrounding the rectum.

Extensive sinus.

I have several times known a sinus form on each side of the anus, and communicate around the rectum, of which we have a preparation in the collection of St. Thomas's Hospital, so that the rectum has been considerably separated from the surrounding parts. I examined a man who died of a discharge from a sinus in the groin, and who had a fistula in ano; and upon tracing the sinus in the groin, it passed under Poupart's ligament and took the course of the vas deferens, and descended into the fistula in ano.

Case.

Small sinus.

Sometimes the sinus only just reaches the sphincter, and is extremely small, at first appearing only as a suppuration of one of the follicles of the anus. Sometimes the matter burrows four inches by the side of the rectum.

Caused by a pile.

The abscess has, in some instances, its origin in a suppurating pile.

Origin sometimes local.

Fistula in ano is, in a few instances, a local disease, depending

upon a change in the part itself; but is much more frequently the result of distant visceral complaints, and of a broken state of the constitution.

When confined to the part, it arises from obstinate costiveness and the efforts to discharge the fæces; and the passage of an indurated stool produces inflammation of the muscles and cellular tissue of the rectum. But the opposite state to the above I have several times known produce it; thus, in a severe diarrhœa, which determining large quantities of blood to the rectum, and being accompanied with tenesmus, is followed by inflammation and suppuration at the extremity of the rectum. How produced.

But the more common cause is disease of the liver, which, preventing the free return of blood from the intestines, leads to inflammation at the anus, and by influencing the secretions from the intestines, occasions a similar effect.

Diseased states of the lungs are also frequently giving rise to it, from the impediments they produce to the free return of blood, local venous congestion is produced: piles are a common effect, and abscesses at the anus frequently follow.

Often, therefore, before a person perishes from phthisis, he has a fistula in ano; and this is the reason fistula is considered as a dangerous disease; although in reality it is not so, but it is the consequence of more important diseases, which destroy life. Connected with phthisis.

The surgeon often brings discredit upon himself by operating in these cases in the last stage of phthisis, when no operation ought to be performed, and when it is impossible the disease can be cured; therefore that death, which is the result of pulmonary disease, is falsely attributed to the fistula in ano.

The medical treatment of this disease consists in restoring the secretions of the liver and intestinal tube, by submurias hydrargyri, or pil: hyd: at night, and infus: gentianæ compositum, with soda and rhubarb, twice in the day; and if there be any pulmonary or pectoral disease, its treatment must precede, and its cure be performed, before any active local means of treatment be had recourse to. The strength of the patient must also be restored Medical treatment.

before any operation be performed, or the wound will not heal favourably.

Local treatment.

If a patient applies with a tumour near the anus, threatening the production of an abscess, and the general health be tolerably good, its treatment is to be as follows:—apply leeches to the part, and let a lotion of the acetate of lead be constantly kept upon the surface. Give to the patient the confectio sennæ with sulphur, as the most gentle aperient; all drastic medicines exert too much action of the muscles of the rectum, and determine blood to the anus, so as to add to the irritation and increase the disposition to suppuration.

To be opened early.

If the swelling increase and become more painful, apply fomentation and poultice to the part. When a fluctuation can be perceived, put a lancet into the swelling, as an early opening prevents a large collection of matter, and I have known the wound immediately close and no fresh accumulation follow.

If it break by natural efforts, it is best to suffer it to discharge and to fill by granulating, to make the sinus as small as possible before any operation be performed.

The sinus very rarely heals entirely by natural processes, because, as soon as its sides adhere, they are pulled asunder by the action of the sphincter ani, and union is thus constantly prevented.

Four states of fistula.

There are four variations of the fistula, as regards the operation.

Operation for the first.

The first is that in which the abscess breaks into the rectum and near to the anus; and the operation consists in the following steps: introduce a probe into the sinus, by the side of the anus, and carry it into the rectum, so as clearly to ascertain the course of the sinus, and to learn if any part of it extends above the opening into the rectum. Then introduce the director, and pass the probe-pointed bistory of Mr. Pott through the sinus into the rectum. The finger covered with oil is next to be introduced into the intestine, and is to be placed upon the extremity of the probe-pointed bistory; then, if the sinus be of considerable length, the finger and knife are brought out together, so that the knife cuts the intestine and

sphincter as it is withdrawn. If any portion of the sinus remain above the opening into the rectum, it should be divided with the probe-pointed scissors; one blade of which is passed into the extremity of the sinus, and the other into the rectum, and then, by shutting them, the sinus is divided. If the opening into the intestine be situated only a short distance from the anus, the end of the bistory may be first brought out at the anus, and the operation completed by pushing the knife forwards.

The second state of the sinus is that in which the opening is only at the anus; and when the probe is passed into it, it is felt at the extremity of the sinus, at some distance from the rectum. Second state.

In this case, what I do is this: I pass the probe-pointed bistory to the extremity of the sinus and my finger into the rectum. I then, with the extremity of the finger and the finger-nail, move the rectum upon the blade of the knife near its probed extremity, and sometimes move the knife a little at the same time. Thus, I easily make the knife divide the intermediate parts, and then bring its probed point into the rectum, when the operation is concluded as in the first case. I have known, in this instance, the division made by the sharp-pointed curved bistory; but the objection to it is, that its point rarely takes the course of the sinus: then a portion is left undivided. Operation.

Savigny, an ingenious instrument maker, made a double bistory, with a pointed and a probed knife: the one sliding by the side of the other. When it was introduced the sharp-pointed bistory was thrust forward, and then retracted, and the probed bistory succeeded it; but the objection to this instrument was, that it was too large for its easy introduction into the sinus, and it is really quite unnecessary.

The third state is, that where the sinus enters the rectum, and has no external opening. It is required, if the orifice cannot be felt by introducing the finger into the rectum, to wait until an accidental inflammation leads to the capacity of feeling a swelling externally, when a lancet should be put into it from the side of the Third state.

anus. A probe being introduced, it passes into the suppurating cavity communicating with the rectum.

Operation. In this case it will be proper to perform the operation which has been described for the first state of fistula when there is an opening externally, and within the rectum.

Fourth state. The fourth and last state is, that in which the sinus or sinuses extend from the anus into the nates.

Operation. The practice I pursue is, then to divide the opening in the nates through the external skin, but leave that near the anus at first undivided, and when I have healed this part, then operate upon the other in the same manner as in the second kind of fistula.

OF TREATMENT AFTER THE OPERATION.

Local treatment. When the fistula has been divided, put dry lint into the wound, and compress the part until all bleeding has stopped. On the following morning apply a poultice, and in two or three days the lint will separate. Then pass a probe into the wound often, to prevent the union of the sides of the sinus for five or six days from the operation, and continue to poultice; but after this time, when granulations arise, it is right to introduce lint into the wound, and prevent their inosculation, until the wound, gradually granulating every where, the cavity becomes filled. If lint be introduced into the wound on the second, or third, or following days from the operation, great pain is given, and much inflammation is excited, so that there is danger of fresh suppuration: wait, therefore, until the inflammation has ceased, and then introduce but a small quantity of lint, and with great gentleness.

Constitutional treatment. If the sore be very indolent, occasionally purge the patient, and give him the confectio piperis, which produces very healthy granulations, and apply to the wound lint dipped in a solution of the sulphate of copper, or spread with the unguentum hydrargyri nitrico oxydi.

OF INJECTIONS FOR FISTULA.

Of the cure by injection.

Although, as it will be readily believed, I have seen a multitude of cases of fistula, I have only known two cured by injection, which were as follow:

I was attending, with Mr. Pugh, surgeon, of Gracechurch Street, a lady, in Fenchurch Street, who had a fistula on each side of the anus. I opened one fistula, and cured it; but the patient would not submit to the operation upon the other. Mr. Pugh and I therefore agreed that we would try other means, and we injected into the sinus with oxymurias hydrargyri, the liquor calcis gr. l. ad ℥j. and the sinus healed.

Case.

The second case was a gentleman from the North, a friend of Lord Harewood, who had been under the care of Mr. Hey, of Leeds, for a fistula on the right side of the anus, and who came to me for advice. The fistula was of great depth and distance from the rectum upon the opposite side. I feared opening it, both from the delicate health of the patient, and the danger of hæmorrhage; and therefore threw into the sinus equal parts of port wine and water. My nephew, Mr. Bransby Cooper, finding it did not bring on sufficient inflammation, injected port wine, undiluted, and thereupon inflammation followed; adhesion was produced, and the case terminated without further alteration.

OF SETON FOR FISTULA.

Of the cure by seton.

Timid persons prefer this mode of treatment to the knife, although in the one case the irritation is long continued, and in the other the pain is only of a few minutes continuance.

That it succeeds, in some instances, I have known; for some of my patients, having submitted to this remedy, returned to me well.

My objection to it is, that the irritation it produces is liable to occasion other abscesses, whilst healing that for which it is employed.

OF PILES OR HÆMORRHOIDS.

Two states.

These are found in two states, viz. a varicose enlargement of a vein; or an excrescence arising from its adhesion and organization.

The first is external or internal.

Of the external

The symptoms of the first are an external swelling, which feels round and hard, which is painful at the passage of the stools: is hot and itches at other times. It sometimes bursts, and discharges blood with the stools. In a few days it declines and disappears. Sometimes it becomes inflamed, and very acutely painful; and it now and then suppurates, and lays the foundation of fistula. If cut into before suppuration, a large and very solid clot of blood passes from it.

Repeated returns of this complaint engender an excrescence, which arises from the swelling having undergone adhesion, and become organized, forming a cutaneous tumour which is very vascular. The skin over it is thin,—the substance very irritable, and pains shoot from it into the rectum to a considerable height from the anus. I have known a person confined to her bed from the excoriation and suffering produced by such excrescences originating in external piles.

Internal.

The internal piles are originally enlarged veins: they produce pain about the sacrum, bleed frequently, and render the passage of the motions difficult; and the stools are often mixed with blood.

At length many of these become obliterated by adhesion, and form very vascular pendulous tumours in the entrance of the rectum.

Occasion prolapsus ani.

They often occasion prolapsus ani; the patient feels as if there was more motion to discharge, and he forces the rectum until a part of it becomes everted, and the internal piles appear externally, thus producing prolapsus ani. The patient, after each evacuation, is obliged to return these with the finger; the evacuation is in consequence highly painful, tedious, and very often the return of the part is exceedingly difficult.

The bleeding from the piles thus everted is often so profuse, that the weight of the blood exceeds that of the fæces. They sometimes vent a considerable serous discharge. When the number and size of the piles, and the degree of prolapsus becomes great, and there is much difficulty in their return, inflammation sometimes arises in them, and their return is rendered impracticable, without giving an unjustifiable degree of pain. When in this state, in addition to other sufferings, the urine is retained, the fæces pass with extreme difficulty, and there is a free sanious discharge from the part. When thus inflammation is the result of a strangulation of the piles from the pressure of the anus, it is immediately relieved by the return of the parts; but often the inflammation precedes the descent, and then the parts are too tender to be returned. It now and then happens that by this process nature effects a spontaneous cure of the disease; the parts proceed to gangrene, and a slough of the piles is produced, the rectum ceases to prolapse, and at least for a great length of time the patient is rid of his complaint. Profuse hæmorrhage.

The usual cause of piles is a sedentary habit, which leads to congestion of blood in the vessels of the rectum. Causes, sedentary habits.

A diseased state of the liver is also a cause, by preventing a free return of blood. Diseased liver.

Obesity occasions them, by the pressure of the omentum and mesentery upon the mesenteric veins. Obesity.

They, like fistula in ano, frequently arise from pectoral complaints, which affect respiration and the freedom of circulation. Pectoral disease.

OF THE TREATMENT OF PILES OR HÆMORRHOIDS.

If a patient applies with an external pile, open his bowels freely with confectio sennæ and sulphur. Apply leeches to the parts, and a lotion of acetate of lead. If, when the inflammation be subdued, the vein remains enlarged and hardened, puncture it with a lancet, and discharge a large and very firm clot of blood which it contains. Of the external

If it suppurate, fomentation and poultice will be the best appli-

cations: and when it bursts, if it shows no tendency to heal, it must be opened into the rectum.

The excrescences left by external piles are growths only of the skin, and they may be freely removed when they become troublesome. Subdue the inflammation first, with evaporating lotions, and then remove them by scissors, or by the knife. The former is by far the most painful mode to the patient, but most easily performed by the surgeon.

Do not bleed. These excrescences furnish no bleeding of any consequence.

Mode of removal. I generally pass a tenaculum through them, draw them towards me, and cut them off with a lancet.

Treatment of internal piles. The treatment of internal piles is more difficult, and requires attention to a number of circumstances.

Medical. First. The medical treatment demands the exhibition of confectio sennæ cum sulphure; the bals: copaibæ is also a good medicine. If there be hepatic congestion, gentle doses of blue pill should be given, to restore the biliary secretions; in general, however, mercury disagrees in piles: Ward's paste, or confectio piperis of the London Pharmacopœia, is an admirable remedy, opening the bowels gently, and contracting the dilated vessels; soda and rhubarb I have known useful. If piles arise, as they sometimes do, from diarrhœa, the confectio opiata is the best medicine.

Local. The local treatment, to prevent their increase, is to inject cold water into the rectum twice per diem; a dilute aluminous injection is also useful, combined with decoction of oak bark.

Diet. The diet must be attended to; animal food is better than vegetable, as occupying less bulk to afford the same degree of sustenance, and consequently presses less upon the returning blood vessels. Mutton is the best butcher's meat. White fish is easy of digestion. All flatulent food should be avoided. A good deal of exercise should be taken; and I have seen, in the incipient state of this disease, horse exercise of great benefit.

Hæmorrhage. When the piles bleed, the medicine should be infusum rosæ cum magnesiæ sulphate; cold water should be still injected.

If prolapsus be produced, it should be washed with a solution of alum and oak bark, and it should be returned by a piece of linen dipped in oil, or covered by ceratum cetacei. Prolapsus.

When the piles are inflamed and a prolapsus is produced, purge the patient once freely; apply leeches; foment and poultice the part, and give opium as soon as the purgative medicine has operated. For two or three days let the bowels be quiet: the leeches, fomentations, and poultices being continued, then purge again; for daily purging adds to the inflammation and irritation. Inflammation.

I have known the application of cold water to the prolapsus useful, also the acetate of lead lotion, and the lotion mixed in a poultice, agrees best upon the whole; although the warmer applications are the most congenial with the patient's feelings.

Spontaneous bleedings from the piles greatly relieve them; and I have therefore sometimes punctured them with a lancet, with a view to the relief of the congestion of the vessels. Puncture.

However, all the means which can be employed will not always prevent their increase; nor when they are once suffered to acquire considerable magnitude, and to produce prolapsus ani, can they be subdued by any medical or local treatment short of operation.

To examine a patient properly under these circumstances, and to enable you to form a correct judgment of the necessity for, and the mode of operating, it it necessary that the patient should have an evacuation; and that, before the return of the prolapsus, the surgeon should examine the part. Mode of examination.

He will then observe a portion of the rectum, forming the outer circle, and a number of round and dark-coloured projections, occupying the more central parts of the protruded mass. The operation is then ascertained to be necessary or not, according to the degree of prolapsus and the number and size of the piles.

Having determined that an operation is required, it is next to be considered in what manner it is to be performed.

It may be done by excision, or by ligature, or it may be effected by a combination of the two. Two modes of operation.

Excision.

For excision, in the early part of my surgical career, I was a strong advocate; for I found it a less painful operation than ligature, and it appeared to me not dangerous; but as my experience increased, I was induced to change my opinion, and to consider excision as not divested of danger.*

The three following cases are proofs of this: the first, dying of inflammation; and the second and third from hæmorrhage. I have also seen, in a fourth case, extensive suppuration produced by excision.

Case.

Mrs. O——, the wife of a respectable medical man, came to London to have some hæmorrhoids removed; and I advised their excision, observing, that her constitution was of a feeble and irritable kind. I removed only one of three which appeared. In three days after the excision by scissors, I found her complaining of great pain in her abdomen, from intestinal and peritoneal inflammation: she frequently vomited, and her abdomen became tense. The symptoms were not relieved, although motions were procured, and she died in a week from the operation. The internal surface of the intestine, and the peritoneum, were inflamed extensively.

* A notorious quack, ambitious of Chirurgical notoriety, would try his hand on a poor unsophisticated Welchman, in the employ of Messrs. B. & P. for the cure of his piles. He excised one of considerable magnitude with his shop-scissors, but before the poor fellow got home, the hæmorrhage became so profuse that the blood literally overflowed his shoes. This Pile-doctor was sent for to arrest the further effusion of blood, but all his efforts, from the previous evening till Seven o'Clock the next morning, were unavailing: persons about him declaring that he must have lost a pailful of blood, notwithstanding a large wash-hand basinful of *Parker's Roman Cement*, flour, brick-dust, and rags, were to be removed from his nates, before the bleeding vessel could be discovered. To repress the hæmorrhage, I introduced a cylindrical tent into the rectum, and applied a ligature on the bleeding vessel; no peritoneal inflammation followed, but the man was a considerable time before he recovered. What a contrast! Sir A. Cooper is justly applauded for the candid admission of his unsuccessful cases—the hero of this note narrowly escaped immersion in a horse pond. L.

Mr. Esdaile came to London from Guernsey or Jersey, in order to have a hæmorrhoid removed. Mr. Leman and I attended him, and I removed a single pile by scissors. On the following day he was exceedingly low, his pulse small, so as to be scarcely perceptible. On the next he voided a great quantity of blood from his intestines; and on the day after he died, falling a victim to internal bleeding, from the return of the divided vessel with the prolapsed intestine. Case.

The Earl of S—— applied to me for piles with prolapsus ani, and I removed some of the largest with scissors; the prolapsus was greatly relieved; and for more than twelve months after he was little troubled, either with hæmorrhoids or prolapsus. About two years afterwards he again applied to me, for a return of his complaint; and seeing his age, and having examined the piles, I thought before I operated, I would have a consultation, when the operation of excision was again recommended. I removed with the scissors one of the largest, and desired his lordship to keep the recumbent posture. He laid down upon the bed immediately after the pile was removed. In about ten minutes he said "I must relieve my bowels," and he rose from his bed and discharged into the close stool what he thought to be fæces, but which proved to be blood. In twenty minutes he had the same sensation, and evacuated more blood than before, in about the same lapse of time: he again rose, and soon became very faint from the free hæmorrhage. I, therefore, opened the rectum with a speculum, and saw an artery throwing out its blood with freedom, I therefore requested him to force down the intestine as much as he could, and raising the orifice of the bleeding vessel with a tenaculum, secured it in a ligature, and also compressed the artery with a piece of sponge. His lordship bled no more. On the following day he was low, his pulse very quick, and he had a shivering: on the next he complained of pain in his abdomen; he had sickness, and tenderness upon pressure, and in four days he died. In the presence of Mr. Wardrop, I opened his body, and found inflammation of the rectum, and disease of the glandulæ solitariæ of the intestine, they being enlarged and Case.

hardened, so that the intestine internally had a curious spotted appearance. He was not, therefore, a healthy or sound man in other respects; and it is in such cases that unexpected symptoms arise after operation.

Ligature.

As a ligature prevents the danger of bleeding, it is best to use it although the process is more tedious and painful. The pain which it produces may be mitigated by not drawing the ligature too tight. Draw down the pile with forceps, or a tenaculum, and tie a piece of waxed silk around it, draw the knot until the patient complains severely, then tie a second, cut off the ligature a little way from the knot, and return the intestine and pile.

Double ligature.

But in cases in which the pile is very large, a safer and less painful plan may be adopted; namely, to pass a needle and ligature through them, and to cut them off beyond it.

Operation.

The mode of operating for these large hæmorrhoids is as follows: Draw down the pile, pass a needle, with a double ligature, through its juncture with the intestine. Cut off the needle, and the two ligatures will remain on the pile; then tie one above, and the other below, and thus the whole pile is included; then cut off the pile with a lancet or scissors beyond the ligature, and in the evening, or on the following day, the threads may be removed, as all danger of bleeding has ceased.

By this operation hæmorrhage is prevented, and the pain is exceedingly diminished, as the ligature does not require to be made very tight.

The prolapsus ani generally soon ceases after the complete removal of the piles; but if it does not, cold and astringent injections should be employed, and the confectio piperis be given.*

* Persons afflicted with piles will do well to observe the following plain rules.

First, Never to strain at stool, for by the violent expulsion of the fæces, and the great haste with which it is frequently accompanied, the hæmorrhoidal veins become distended with blood, before there is time for them to return to their natural state.

Secondly, Wash the part immediately with a sponge and cold water: the habit is cleanly, consequently salutary: and the cold water exerts a very considerable influence in astringing those over-gorged veins.

LECTURE XXXV.

OF POLYPUS OF THE NOSE.

POLYPI of the nose are of four kinds; First, the common pendulous polypus; Secondly, the hydatid polypus; Thirdly, the cancerous; Fourthly, the fungoid. Four kinds.

OF THE COMMON PENDULOUS POLYPUS.

This disease is marked in its commencement by an occasional obstruction in the nose, as if from catarrh; the obstruction being increased in foggy and damp weather, and being greater early in the morning and late in the evening than in the middle of the day. Symptoms.

Persons of all ages are subject to the formation of these polypi: but it is of more common occurrence between the ages of forty and fifty than at any other period. Age.

On looking into the nose, a jelly-like appearance is seen, which, upon directing the patient to inhale through the nostrils, recedes, and upon his exhaling advances and re-appears; the degree of motion, however, necessarily depends on the magnitude of the polypus compared with that of the nostril. The voice has a nasal sound, and there is generally some uneasiness felt between the eye-brows, in the situation of the frontal sinuses. Appearance.

Thirdly, Let this be the last action of the day, in order that the horizontal position may be assumed immediately after; which will greatly facilitate the ascent of blood in the hæmorrhoidal veins, and this might be assisted by gentle pressure.

Fourthly, As piles are produced by the blood being obstructed in its passage about the anus, proper attention should be paid in emptying the lower portion of the bowels; and when this difficulty exists, the ordinary posture on the water-closet may be dispensed with advantageously. L.

Seat.

The polypus grows from that portion of the schneiderean membrane which is situated upon the same side with the turbinated bones. I have never yet seen a polypus growing from that covering, the septum narium. The body of the polypus is generally yellow, and is streaked with few vessels. Its neck diminishes often to a very small stalk. Now and then two or three polypi grow from a single stalk. When a polypus becomes very large, instead of advancing to the nostril it recedes into the throat, appearing behind the velum palati; and sometimes when it grows from the back of the nares, it makes its first appearance in the throat. It here becomes of very considerable size, and at length would readily allow a ligature to be passed around it; but this, as I shall presently describe, is not the best mode of its removal. When it appears in the throat, I have seen its body divided into a number of different portions.

In the collection at St. Thomas's Hospital, their great size and broken surfaces are well seen in many preparations, as well as their origin from the pituitary membrane.

OF THEIR REMOVAL.

An operation necessary.

No other mode than an operation will succeed in removing these excrescences. I have repeatedly tried the application of caustic; but it only acts upon the surface, and the root grows faster than that surface can be destroyed. Aluminous and other astringent applications render the breathing a little more free at the moment, but produce no permanent relief.

Three modes.

Three modes have been proposed for their removal: First, by laceration; Secondly, by excision; Thirdly, by ligature.

First, by laceration.

First. Laceration is the usual mode. For this purpose, a surgeon should be provided with two pair of forceps; one pair slightly curved, terminating in a point hollowed at the end, and that hollow containing pointed teeth, having an aperture in each blade. A second pair, formed like common dressing forceps, only the blades longer and more slender, having serrated teeth, received

between each other like a serrated suture of the skull. These can be received into the smallest nostril, and readily made to act in any part of it.

The operation is performed as follows: the patient sits upon a chair opposite a strong light, a probe is then introduced into the nostril, and the surgeon feels with it the exact situation of the stalk of the polypus; then withdrawing the probe, he passes the forceps to the stalk, and, enclosing it between the blades, with very gentle jerks, he either tears through the stalk, or draws away the portion of membrane from whence it grows: instead of removing it by jerks, the surgeon may turn the instrument upon its axis, and thus lacerate the stalk of the polypus. Now and then a thin film of bone separates with the pituitary membrane, which only more effectually secures the patient from a return of the disease. Operation.

If more than one polypus exist in the nostril, a separate operation is required for each; and if they exist upon each side, the operation may be performed on the same day in each nostril, for there is no danger in this operation. I never knew but one person die in consequence of it; he had previously had some disease in the brain, a piece of lint was placed in the nostril, after the operation, and this gentleman died a few days after of inflammation of the brain. It is better not to introduce lint, or any extraneous substance likely to produce irritation, immediately after the operation.

The hæmorrhage which results from this operation never amounts to any serious quantity. No serious hæmorrhage.

As the disease is liable to return, when the inflammation succeeding the operation has subsided, aluminous injections may be used, or the liquor calcis with oxym: hydrarg: to lesson the disposition to the return of the complaint.

To remove them from the posterior nares, I have used curved forceps, introduced behind the velum; but they do not answer so well as the mode I have next to describe.

Secondly, by excision.

This operation requires a pair of scissors with probed extremities, made straight, with long and slender blades.

Operation.

The patient being placed as in the former operation, the scissors are at first introduced shut, in order to ascertain the attachment of the polypus; and being then opened, the stalk of the polypus is cut through; then the surgeon, closing the other nostril, directs the patient to blow forcibly through that in which the operation has been performed, when the polypus is immediately ejected; but if the polypus appear in the pharynx, the surgeon divides the stalk in the same manner as before, and then putting his finger behind the velum palati, he with it draws the polypus away through the fauces. In that way the largest polypi are to be removed; and I have never seen either danger or difficulty arise from its performance; but, on the contrary, have several times succeeded when the forceps by the nostrils had been employed in vain.

Objection to this mode.

It has been objected to this mode of operating, that very considerable hæmorrhage is produced by it; but this can only arise from a very indiscreet manner of performing it, by repeatedly cutting the pituitary membrane, which could hardly happen with probed scissors.

Thirdly, by ligature.

The third operation, namely, that by ligature, is now very generally abandoned by surgeons, on account of the difficulty of its application, and the necessarily imperfect removal of the disease.

Disease resembling polypus.

There is a disease in children very frequently mistaken for polypus, by men who have not had much experience in surgery. It is an elongation of the pituitary membrane of the nose, from relaxed constitution, and from effusion of serum into the cellular tissue of the part; it is red and very vascular. It appears more upon the extremity of the superior turbinated bone than upon the inferior; but I have seen it upon both. It sometimes becomes chronic. It requires alterative medicine, and the application of a solution of alum, or of sulphate of copper, or nitrate of silver. I

have more than once known this disease removed by forceps cruelly and unnecessarily.

OF HYDATID POLYPUS.

The nostrils of young persons sometimes become filled with growths which appear of the hydatid or encysted kind. They resemble wetted bladders hanging within the nose, are unattended with pain, but produce the inconvenience of occasional obstruction. When pressed with forceps they burst, and discharge a mucus, somewhat resembling that secreted by the schneiderean membrane: the cyst only is removed by the forceps. The nose may be repeatedly cleared of them by instruments, but they are always regenerated. By continued growth they enlarge the nostrils, and deform the face.

Occurring in young persons.

I have seen them removed in two modes: First, by the use of a strong solution of alum introduced on lint, and constantly worn; Secondly, by the daily application of the muriate of antimony used by a dossil of lint through the medium of a canula. The first is the preferable mode; but I cannot decidedly speak as to its preventing the return of the disease: they are destroyed more quickly by the muriate of antimony, but with much more suffering.

Two modes of removal. By alum. By muriate of antimony.

OF THE CANCEROUS POLYPUS.

This is a disease of age.

Occurs in elderly persons

It commences with obstruction in breathing, but is, at first, unattended with pain; as the disease increases, the sufferings are very acute, and not confined to the diseased part, but extend to the different branches of the fifth pair of nerves, striking sometimes into the brain itself.

Symptoms.

Its growth is slow, and it is some time before it produces any discharge; but at length it ulcerates, and discharges a bloody serum.

Slow growth.

Colour.

Produces deformity.

Its colour is purple; its feel is firm. It sometimes bleeds with great freedom. It sloughs, and in its progress it produces great alteration in the form of the face, which it disfigures horribly. It extends into the sinuses, and frequently affects the lachrymal sac.

It often alters the roof of the mouth, producing absorption of portions of the superior maxillary and palate bones.

Destroys life gradually.

It is a long time in destroying life; the latter days of the patient cannot but excite pity in the most unfeeling bosom. Medicine and surgery do nothing for this disease: excepting opium, belladonna, hemlock, and hyoscyamus are administered locally and constitutionally, to mitigate, in some degree, the patient's tortures; and the dose of the former is at last increased to keep the patient in a constant state of torpor.

OF THE FUNGOID POLYPUS.

Occurs at all ages.

The fungoid polypus occurs at all periods of life; but the best case which I can give of this disease is the following:

Case.

A young gentleman came to my house with a large purple excrescence projecting from the nostril, which completely obstructed the passage on that side. I made a cast of this disease, which is now in the collection at St. Thomas's Hospital. There was a copious discharge of sanious fluid from it; but the disease was little painful, and the general health was, at first, but little affected. I passed a ligature around the root of the polypus as high as I could reach, and it sloughed away without hæmorrhage. I was gratified with the result of this operation, as the patient appeared to be greatly relieved; but some time afterwards I heard that the disease had returned, and that it had been again removed. It again grew, and ultimately destroyed life. The head was examined, and the disease was found to have grown from a very small surface of the pituitary membrane.

Extends.

In general, the disease enters the different sinuses, affects the lachrymal sac, and ductus ad nasum; bleeds copiously, but has not

the pain accompanying cancerous disease. The patient dies from copious discharge, the frequent hæmorrhages, and at last from nervous irritation.

OF POLYPOUS EXCRESCENCES IN THE PHARYNX.

I have seen two cases of this disease.

One in a Spanish gentleman, who came through Paris, where he consulted various surgeons; and on his arrival in London, asked my advice for a polypous excrescence in his pharynx, of the colour of the mucous membrane of this portion of the alimentary tube, beginning from the fold over the palato-pharyngeus, and hanging down like a sausage into the pharynx. By great efforts he could regurgitate it into his mouth. I requested him to permit me to pass a ligature around its root, which I succeeded in doing, without much difficulty, and it separated in eight days. Case.

I lately saw a second case, with my nephew, Mr. B. Cooper: it was similar to the former in appearance, but not quite so large, and grew more from the root of the tongue. I removed it also by ligature, and both these cases completely succeeded. Case.

POLYPUS OF THE RECTUM.

I have several times seen the following disease.

A lady sent for me to see her infant, who, she observed, after a motion, had a substance like an earth-worm appear at the anus, of considerable length, and of a red colour. Upon examination, after an evacuation, I saw at the anus a red projection, and upon pulling it down, found it to be of considerable length, growing about an inch to an inch and a half from the anus, attached to the interior of the rectum. I drew it down, put a thread around it, and cut it off as near to its origin from the rectum as I could, and it never returned. Case.

Sometime after, a child was brought to me from Surrey, with the same disease; the substance looked like a leech, and I cut it off Case.

without putting a thread around it. Whilst at Lecture I was sent for to attend the child on account of hæmorrhage, and I begged Mr. H. Cline to visit the patient for me; but he soon returned and informed me, that the bleeding had been of little consequence, and had stopped spontaneously. The child recovered.

Case. In a stone patient of Mr. Gaitskell's, upon whom I was operating, the child having prolapsus ani, I saw a small excrescence, red and pendulous, growing upon the mucous membrane of the intestine, which I thought was the commencement of one of these diseases.

Case. I have only twice seen this disease in the adult; once at the age of twenty-three years: I put a ligature upon its root, and removed a portion beyond the ligature, having the external appearance of a common earth-worm.

Case. An apothecary of Bristol, a friend of Mr. Brickenden, surgeon, in the Borough, came to me, some years ago, with a polypus growing in his rectum, about two inches from the anus, which I removed: he had previously been subject to dyspeptic symptoms, with great irritability of the rectum, which subsided after this operation, and the use of alterative medicines which were given him.

OF FUNGOID POLYPUS OF THE RECTUM.

Case. A gentleman was brought to me by Dr. Hopkins, of Peterborough, who laboured under this disease, the symptoms of which were a copious and sanious discharge from the rectum; very little pain; but upon his going to stool, or even by efforts in which the fæces were not discharged, a polypus was protruded, having a broken surface like a cauliflower, large as an egg, and of a dirty brown colour, breaking readily, and bleeding where it broke. The general health had not materially suffered. I put a ligature upon the neck of this polypus near to the mucous membrane of the intestine: it sloughed away in a few days, and for some time the gentleman appeared to be well; but having occasion, many months afterwards, to go through Peterborough, I was requested to see this

gentleman; when I found the disease had returned, that the rectum had ulcerated, and that his health was broken: soon after he fell a victim to the disease.

In the present state of medical and surgical knowledge, this disease, like the scirrho-strictured rectum, will prove destructive.

OF ENLARGED TONSILS.

Enlargement of this part, from common angina, is a frequent occurrence; and it is best relieved by purging, by leeches applied to the throat, or by a blister placed beneath the angle of the lower jaw. Of frequent occurrence.

If the gland suppurate, the pain is exceedingly severe; the attempts to swallow are agonizing, and the painful sensations extend along the Eustachian tube to the ear. When matter has formed in the tonsil, it may be detected by applying the finger to the surface of the gland in the fauces. Sometimes suppurate.

Fomentations and poultices assist its progress most effectually; and I think, upon the whole, that they do best when left to break spontaneously. But when great difficulty of breathing attends the presence of matter, it should be discharged by puncture with a small lancet, or with the knife used to divide the cornea. Some danger attends the operation of opening such abscesses, and circumspection is required to prevent a wound of the internal carotid artery. Treatment.

After the matter is discharged, the case speedily does well.

Sometimes a chronic enlargement of the tonsils occurs, and injures the health by the difficulty of breathing it produces, the person is obliged to sleep with the mouth widely opened, yet still there is much impediment to the passage of the air, and consequently much stertorous noise. Chronic enlargement.

Children labouring under this disease are often found during sleep, in profuse perspiration, especially about the head, arising from this excessive dyspnœa. Symptoms.

Treatment.

The treatment of this state consists in applying powdered alum to the surface of the tonsil; in using the sulphate of copper, in substance, so as to whiten the surface; or the nitrate of silver, which produces the same effect, and from the employment of which I have known great advantage derived; scarification I have also seen of service.

Removal sometimes required.

If the disease resists these modes of treatment, it will be right to remove the enlarged portion of the gland, either by ligature or by excision.

By ligatures.

A ligature is employed in those cases in which the tonsil is pendulous, and in which the enlarged part is connected to the throat by a narrow neck.

To apply a ligature, an iron is required, with a small fixed ring at its end, and a waxed portion of silk.

Operation.

The patient sitting before the surgeon, and the thread being passed through the ring of the tonsil iron, an assistant holds one end of the ligature against the cheek, and the surgeon retains the other in his hand. The iron is then carried above, behind, and then below the tonsil, and is, with the end of the ligature, brought out of the mouth; after thus nearly surrounding the gland, a single knot is made, and one end of the thread being again passed through the ring of the tonsil iron, the knot is by means of it made fast, and a second knot is then made, in the same manner. The silk is left upon the tonsil until it ulcerates through the gland, which it does in about a week.

Another mode.

When the basis of the swelling is large, a needle has been advised, armed with a double ligature, which is to be passed through the base of the gland: then each ligature is to be tied separately, one before and the other behind the tonsil, and by this mode the ligatures are prevented from slipping; but their application is very difficult, and, as far as I have seen, very imperfect. Rather than adopt it, I advise the removal of a portion of the gland by excision.

By excision.

This is to be done by a pair of curved scissors, with probed

extremities, with which there is less risk of wounding any important part. It is best, however, to remove small portions, and to proceed gradually, by repeating the operation as occasion requires; and to touch the surface with nitrate of silver or sulphate of copper.

In these cases there is usually much general debility, and it is right to give soda, steel, and rhubarb, and advise country or sea air with bathing, and a generous diet.

OF ELONGATION OF THE UVULA.

I have seen this part grow to a considerable length. There is one in the collection at St. Thomas's Hospital, which the boy could throw forwards between his incisores teeth. Sometimes of great length.

By hanging upon the epiglottis, it produces coughing, or by irritating the pharynx it occasions sickness; and by creating irritation of the glottis it produces an alteration in the voice. Symptoms.

It arises from relaxation and over exertion of the voice in speaking. Cause.

Stimulating gargles, sulphate of copper in solution, or directly applied in substance, and alum, are useful; but sometimes the enlargement becomes so distressing, as to occasion a necessity for its immediate removal. Treatment local.

The mode in which this is effected is as follows. The end of the uvula is seized with a pair of polypus forceps, and it is then drawn forwards, so as to be put upon the stretch, and that portion which exceeds the natural length of the part is removed by a pair of curved and probed scissors. Operation.

No bleeding of any consequence follows; and the only attention afterwards required is, to avoid any unnecessary exposure to cold air.

I have several times had occasion to perform this operation, and have never seen any ill effects arise from it, but often the greatest advantage produced. Not dangerous

LECTURE XXXVI.

PARACENTESIS OF THE ABDOMEN.

Two kinds.

DROPSY of the abdomen is of two kinds: First, Peritoneal, or ascites; Secondly, Encysted, or ovarian.

OF ASCITES.

Symptoms.

The first symptoms of this disease is an unnatural sense of fulness in the abdomen after taking food, which renders it necessary to loosen the clothes; next, an increase of the lower part of the abdomen, observable at all times whilst the patient is in the sitting posture. When the patient lies down, the increase in the abdomen is general, and the enlargement is accompanied with an unusual tension; as if the abdomen were inflated In the sitting posture, a fluctuation can be perceived in the hypogastric and lower part of the umbilical regions, by placing the finger on one side and tapping on the other. In the recumbent posture, the intestines appear to undulate in the cavity, having more than their usual motion. As the disease increases, the swelling extends from the lower to the upper part of the abdomen, occupying the whole cavity.

Little pain is felt, but considerable inconvenience arises from the distension, more particularly when the patient is in the recumbent position, on account of the action of the diaphragm being impeded. In proportion as the distension is greater, the fluctuation becomes distinct; and when the tension is extreme, the gentlest tap on the abdomen leads to a perception of the fluid. The secretion of urine is scanty. The enlargement of the abdomen is followed by swelling of the legs, either from the pressure of the fluid upon the veins returning the blood from the lower extremities, or from the general debility which accompanies this disease. I have known, when the omentum has been very considerably thickened, the perception of

the fluctuation in the abdomen to be indistinct; and, under the same circumstances, in tapping, the quantity of fluid which has escaped has been a portion only of that contained in the cavity, part being confined behind the omentum.

The usual quantity of fluid collected is from twenty-eight to thirty pints; but when a patient has been tapped several times, the abdomen becomes much more enlarged, and the quantity is then from thirty to forty pints. In young persons the quantity is small; and the smallest quantity I have known drawn off by operation was in a medical student; it amounted only to six pints. Quantity of fluid.

The nature of the fluid secreted varies but little in ascites; it is much more watery than serum, containing relatively a small proportion of albumen. It has generally a watery appearance, has a slight yellow tinge, and does not vary in its appearance and consistence, as the fluid of other species of dropsy. If inflammation succeeds the performance of the first operation, flakes of fibrin or adhesive matter are contained in the fluid next discharged. Nature of the fluid.

The cause of dropsy, when it is confined to the abdomen, is most frequently a disease in the liver, which acts mechanically in producing it. The pressure which the diseased organ occasions upon the vena portæ interrupts the free flow of blood through the vein, produces a congestion in the arteries and veins of the alimentary canal, and of the organs which are connected with it, and consequently leads to a greater effusion from the exhalent extremities of the arteries. Diseases of particular abdominal organs will, by the irritation they excite upon the peritoneum, occasion a greater determination to its secreting surface. Thus disease of the omentum, or of the spleen, will produce this effect. Cause.

I have known diseased mesenteric glands produce ascites; and two children, who, in my recollection, have been tapped for this disease, have recovered. Taking large quantities of spirituous liquors tends to produce this complaint, independently of the organic change it is likely to excite in the liver; its stimulus leading to a greater determination of blood to the vena portæ than can readily

circulate through this vessel, and consequently to effusion from the extremities of the arteries.

But ascites is frequently the effect of disease in the chest, of water accumulated in the cavities of the pleura, of water in the pericardium, or of some organic change in the heart, interrupting the action of the source of the circulation: the blood therefore accumulating in the right side of the heart and in the veins returning the blood to the right auricle, leads to the production of water in the abdomen, and of a general anasarcous state.

It has been a question whether dropsy arises from an increased secretion of the blood-vessels, or from an absolute diminished action of the absorbent vessels. It is generally the former I have no doubt, for reasons which I have already given, when speaking of hydrocele.

OF THE TREATMENT OF ASCITES.

Medical treatment.

The disposition to this disease may be prevented, its progress, when it has begun, may be retarded, and large accumulations of fluid may be removed by medical treatment, and by external applications. If the disease originate in a complaint of the liver, the restoration of its secretions, and an action upon the alimentary canal by mercury, combined with other purgative remedies, become the best means of preventing effusion. If the complaint originate from local disease in some of the other viscera, as in the spleen, or omentum, the secretions must be increased in a similar manner, and blisters should be applied, and for some time continued, on the abdomen.

If water has already begun to form, the best medicines, as far as I know, are the submurias hydrarg: gr: jss. pulv: gambogiæ gr: ss. scillæ gr: iij. in the form of a pill, taken every night: and spir: æther: nitric: ʒss. to ʒj. oxym: hydrarg: gr. ⅛. tinct: digital: gutt. xv. with some camphor mixture, twice or three times in the day.

If water has already formed in considerable quantity, and if the powers of the constitution are sufficiently strong for its employment, the use of elaterium becomes not only justifiable but desirable, as being the most powerful and successful mode of promoting the absorption of the fluid which has been effused. But if the powers of the constitution have been much enfeebled, this remedy becomes dangerous from its severe effect. Even if the ascites be accompanied with other dropsical symptoms, the elaterium is still the remedy most to be depended upon, if the constitution will allow of its use.

An operation necessary.

When medicines fail of their wonted and expected influence, and the accumulation is so considerable as to impede breathing, by preventing the free descent of the diaphragm, or when the patient finds it difficult to assume the recumbent posture, it becomes necessary to remove the accumulation by the operation of paracentesis. I have, however, known in a young person the operation performed for comparatively small collections of fluid, when the increase of the collection had ceased, and no disposition to its absorption had manifested itself. It is absolutely necessary that the fluctuation should be extremely distinct before the operation be proposed; and in cases of diseased liver, spleen, omentum, and mesentery, there is danger of the surgeon's being deceived respecting the disease.

Result of an operation.

With regard to the result of the operation for ascites, when the dropsy arises from disease of the liver, or from organic alteration in the chest, the relief is only temporary; but when it is the effect of constitutional disease, as fever, or arises from functional change only, under these circumstances the operation of paracentesis is frequently followed by a cure. Even in diseased liver, after the removal of the water by the use of the medicines which we have already recommended, I have known the patient ultimately recover. Considerable pressure upon the abdomen after the operation, lessens the disposition to the return of the effusion. Before the operation of paracentesis is described, I shall speak of ovarian or encysted dropsy.

OF OVARIAN OR ENCYSTED DROPSY.

This is a bladder of water, formed within or upon the ovarium.

Symptoms.

The disease is, at first, discovered as a swelling upon the brim of the pelvis, from two to three inches above Poupart's ligament, and is confined to one side of the pelvis. It is unattended with pain, and the general health remains uninjured. Under varied positions of the body, it moves, in some degree, from side to side. It is a very circumscribed swelling, and has an elastic feel; it is often accompanied in its early stages with an irritation to make water, and now and then with a difficulty in its discharge.

Progress.

As it gradually increases, it rises from the lower part of the abdomen to the upper, and occupies more and more the centre of the abdomen; at length it extends over to the opposite side from that in which it began: although it is generally largest on the side in which it commenced; at first the breathing is unaffected; but when the size of the swelling is very large, the action of the diaphragm is greatly impeded by its pressure.

Fluctuation.

The fluctuation in this disease is much less distinct than in ascites; but when it acquires considerable size, it becomes proportionally more and more perceptible. It depends, however, upon the thinness of the cyst. In ascites, the fluid is in direct contact with the peritoneum, on the posterior surface of the abdominal parietes; but in ovarian dropsy a cyst sometimes of considerable thickness intervenes between the water and the peritoneum.

Solid enlargement.

The ovarium is subject to solid enlargements of very considerable bulk; and an ignorant surgeon might plunge a trocar into such a swelling, mistaking it for ovarian dropsy, which a little more attention to its want of fluctuation might have led him to discover.

At first, the water which is formed in the encysted dropsy is contained, not in a single bag, but in several; the septa between which become gradually absorbed, and their number consequently diminished; and this is another reason for the fluctuation being more distinct as the disease advances. The cyst which is, at first,

of considerable density, becomes thinned by a process of absorption, leading to a more distinct perception of the fluid.

The fluid contained in an ovarian cyst varies much in appearance, it being sometimes watery; sometimes serous, containing a large quantity of albumen; sometimes mucilaginous and tenacious, so as to be ropy, but yet coagulating little under the influence of heat. Nature of the fluid.

The colour also varies; sometimes being yellow like serum; sometimes it is brown and frothy; three times I have seen it yellow like pus, and containing similar globules. One case with Mr. Simpson, surgeon, in Lime Street Square, in which a pailful of this fluid was drawn off; a second in a Miss Warner, of the Kent Road; and a third in a Mrs. R. of Chatham Place, whom I lately attended with Dr. Key. Its colour.

I have seen hydatids discharged with the fluid. Hydatids.

The quantity of fluid accumulated in this disease is necessarily varying, but the proportion averages from twenty-five to thirty-two pints. The greatest increase of the ovarium which I have seen is in the collection of St. Thomas's Hospital, in which the accumulation was ninety-seven pints. The least which I have removed has been sixteen pints. Quantity of fluid.

The following is the account upon a tomb-stone, near Dartford, Kent, "Here lies the body of Ann Mumford, daughter of John Mumford, Esq., of Sutton Place, in this parish. Her death was occasioned by a dropsy, for which, in the space of three years and ten months she was tapped one hundred and fifty-five times. She died the 14th of May, 1778, in the twenty-third year of her age, an example of patience, fortitude, and resignation." Case.

This then is a proof of extent of the secretion, and of the necessity, in some cases, for the repetition of the operation.

In the collection of St. Thomas's Hospital there is a preparation showing the origin of this disease; in one ovarium, bags are formed within its tunica albuginea; on the other side, a cyst is produced externally to the ovarium, but pendulous from it; thus there are some cases of it internal and some external to the ovarium. Situation of the cyst.

Adhesion of the cyst.

At first, the bag does not adhere to the peritoneal lining of the abdomen; but as it becomes large, it gradually acquires such adhesion; and, upon dissection of these cases, the cyst is found to have united itself with the parietes of the abdomen, so as to leave no space between it and the peritoneum: the intestines and omentum are situated behind it, under great accumulation.

Burst by accident. Case.

The ovarian cyst sometimes bursts by accident.

Miss Warner, to whose case I have already alluded, was thrown out of a one-horse chaise, and burst the ovarian cyst. She soon afterwards began to make large quantities of water, and the disease disappeared; but in seven years it returned, and she was obliged to be tapped.

Case.

A lady with ovarian dropsy, in getting from her bed, fell against the corner of the night-chair, and ruptured the ovarian cyst, producing extravasation of blood externally: her secretion of urine became abundant, and her abdomen much lessened; but the disease afterwards returned.

Medical treatment.

With respect to the medical treatment of ovarian dropsy, I fear a difference of opinion with many other medical men, when I say, that medicine has but little influence over this complaint.

I have seen the most gentle, as well as the most drastic medicines given to promote the absorption of the fluid, but without success; and when we consider the little vascularity of the cyst in which the water is contained, and also how little influence medicine has over common hydrocele, we shall not be inclined to expose our patients to the trial of these agents.

Case.

Dr. Baillie and myself attended a lady together, who could only hiss her answers to our questions; and when we asked the cause, we learned that for an ovarian dropsy, of which she afterwards died, she had undergone a course of mercury, which had occasioned a sloughing from the inside of her cheeks, without relieving her dropsy: the contraction of the cicatrices in the mouth had produced the alteration in her voice.

Diet. Case.

With regard to diet, I tried in a case of dropsy the following experiment. I tapped a woman in Spitalfields, and I ordered her

afterwards not to drink, but merely to suck an orange when she was thirsty: with respect to her solid food I put her under no restraint. The next time I tapped her, I allowed her to take as much fluid as nature prompted, but she filled faster with water in the former than in the latter case; the cause of the difference appeared to me to consist in the excitement of the kidneys which the fluids occasioned.

Pressure.

A considerable effect is produced in retarding the progress of this disease, by the patient's wearing a belt, which, by its pressure, prevents the ready secretion from the exhalent extremities of the vessels into the interior of the bag. I therefore always lay my patients under the injunction to obtain and wear one.

A patient who is affected with this disease has the general health so little deranged, as not to require any change in the general mode of living; exercise may be taken, and the same diet allowed as under ordinary circumstances.

OF THE OPERATION OF PARACENTESIS.

Not to be performed early.

This operation ought never to be performed early in the disease, but it should be deferred until the accumulation of water by its pressure upon the diaphragm influences the function of respiration.

Reasons for delay.

If the quantity of water in ascites be but small, much danger is to be apprehended of the trocar reaching the viscera; and in the ovarian dropsy the operation must not be performed early, because the adhesion of the ovarian cyst to the peritoneum on the fore part of the abdomen is not yet produced. The viscera, therefore, glide down between the cyst and the parietes; and I once saw, in a case of ovarian dropsy, the omentum caught by the canula, and a portion of it was brought through the opening in withdrawing the instrument, which was obliged to be returned by a probe; inflammation succeeded, and the woman died. This might have been avoided by further delay; therefore the operation should not be performed until the ovarium ceases to move easily from side to side.

A second reason for delaying the operation exists in the numerous cysts of which the tumour is first composed, which afterwards break

into one; but when the operation is performed early, the escape of water is only from a single small cyst.

Before performing the operation in the encysted dropsy, as the fluctuation is much less distinct than in ascites, the greatest care is required to prevent an error.

I will here mention two circumstances, in one of which my character was exposed to considerable risk; of the other I was informed by a medical man who was invited to witness the operation.

Case. In the first case, I was desired to see a lady who I was told laboured under dropsy. When I entered the room, I saw a tall delicate female with an immense abdominal swelling, giving a distinct sense of fluctuation. I requested the physician accoucheur whom I met, to examine if the lady was not with child; he said, he thought it was unnecessary, as the fluctuation was very distinct, but that he would do so, and let me know the result in a few days. I heard no more of her for a week, and then I learned that she had been put to bed on the morning following my visit. I would not have performed the operation of paracentesis for the universe.

Anecdote. The circumstances which were told me of the other case were as follow: A surgeon in a country town called upon another surgeon, and said, "I am going to tap a woman to-morrow; perhaps your young gentlemen would like to be present." As it was an operation they had never witnessed, they most readily accepted the invitation; they were shown into a room in which the patient was already prepared to undergo the operation, she sitting at one end, with her abdomen bare. The surgeon then, taking his trocar and canula, went to some distance, and walking up to the patient with the trocar presented, he charged, as it were with a bayonet, and plunged it into the abdomen; then withdrawing the trocar with an air of triumph, it was with no small chagrin he found not a drop of water escape; but however, still undismayed, he withdrew the canula, and again renewing his attack, he a second time introduced the trocar into the abdomen; but was equally unfortunate as before, in finding that no water followed. Waiting a few moments, he withdrew the canula, and turning round to the gentlemen, he said,

Dry tapping.

"You may do her up;" by which he meant, they might apply the bandages; and he added, "This, gentlemen, is an operation which you probably never saw before, and which most likely you may never see again. This is what we call the operation of dry tapping."

Before performing this operation, the patient should be placed upon an elevated seat with the abdomen bare, a sheet is to be doubled to about a foot in breadth, and is to be passed around the body at the upper part of the abdomen, and the ends being crossed at the back, are to be held by assistants; but instead of doing this, I frequently suffer my patient to remain in the horizontal posture in bed, turning only to the side; by this plan that faintness is prevented, which usually attends the escape of the water if the patient be in the sitting position; a pail is required to catch the water in the first instance, and a basin afterwards. The necessary instruments are a trocar and canula, or a lancet, with a canula shut at its end like a catheter, and with holes on its sides equal in diameter to the canal of the canula. Preparatory position.

If it be ovarian dropsy, and the cyst possesses considerable thickness, it is very desirable that the surgeon should be provided with a trocar and canula of an inch more than the usual length, as I once operated upon a patient of Dr. De Vallangin, in whom I was obliged to employ a much longer trocar and canula, being unable to reach the cavity of the cyst with an instrument of the common length. A long trocar necessary in ovarian dropsy.

The place at which the operation is performed was changed by Mr. Cline from mid-way between the umbilicus and anterior superior spinous process of the ilium on the left side to one inch below the umbilicus; and his reason for this change was, that in the spread of the abdominal muscles from the pressure of the water, the epigastric artery is brought into a situation of risk of being wounded by the trocar, a circumstance which did happen to Mr. Cline. He was tapping a person in St. Thomas's Hospital, and he saw florid blood issue through the canula; the quantity gradually increased as the water flowed; and as the patient was becoming faint, he withdrew the canula and closed the wound, but The proper spot for the introduction of the trocar. Case.

the bleeding continued into the abdomen, and the man died; upon inspection, the epigastric artery was found wounded.

Reflecting upon this circumstance, he was led to consider, that an inch below the umbilicus in the linea alba would be the safest spot for the introduction of the trocar, as no vessel would be there endangered, and it was only required that the bladder should be previously emptied. This part has been therefore of late years usually selected for the operation.

Danger of operating at the umbilicus.

Some have recommended the umbilicus, but the frequency of hernia renders that spot unsafe. An inch above the umbilicus has been also advised; but if there be hernia, it is equally dangerous with the umbilicus itself; and if the umbilical vein remain unclosed, there is a danger of hæmorrhage in performing the operation at that part.

Beside the danger to the epigastric artery in the operation performed at the part formerly selected, there was danger of wounding the spleen when it had become enlarged.

Operation.

The surgeon should place himself on a low stool by the side of the patient; the sheet is then tightly drawn by the assistant across the upper part of the abdomen, by which its lower part is rendered prominent, and the point of the trocar is placed an inch below the umbilicus, and is passed slowly and gently through the linea alba; the trocar is then withdrawn, and the canula being left in, the water is allowed to escape through it. If any interruption to the passage of the fluid by the pressure of the omentum, or of the mesentery on the end of the canula arise, a probe should be gently passed through the interior of the canula to remove the obstruction.

Canula left in the wound.

It has been recommended by Mr. Guy, of Chichester, and others, to leave the canula in the wound, occasionally to suffer the water to flow, and thus prevent its future accumulation.

Sometimes produces a cure.

A slight inflammation of the peritoneum in these cases sometimes succeeds the operation; and by the change of action thus excited in the vessels, its disposition to a future secretion is lessened, and in this way a cure is produced.

Pressure.

Immediately after the operation has been performed, a belt is to be

tightly applied around the abdomen, to prevent the re-accumulation of water by lessening the determination of blood to the parts.

The result of the operation is generally unsuccessful in ascites, as the greater number of cases are accompanied with organic disease: the operation only acts upon the effect, and not upon the cause, and the hope of permanent advantage must be derived from medical treatment, and not from surgical operation; but the removal of the water gives additional facility to the operation of the medical means which are employed. Operation rarely successful.

With respect to the ovarian dropsy, the operation is the only means of relief; but it generally fails in producing a permanent cure.

In ascites forming after fever, and after a course of mercury, and in ascites unaccompanied by organic disease, I have known the operation succeed in producing a permanent cure. In ovarian dropsy, the instances of permanent cure from operation are exceedingly rare.

The case which I have given from the neighbourhood of Dartford, shows the number of times this operation may be repeated.

In the very young and in the very old, I have known the operation succeed.

Of a spontaneous cure of ovarian dropsy I have known several examples. Spontaneous cure of ovarian dropsy.

The wife of a veterinary surgeon had an opening at the umbilicus produced by ulceration, through which large quantities of fluid were for a length of time discharged; but the opening ultimately closed, and the disease did not return. Case.

I have known the water discharged by the Fallopian tube; and I attended a lady in whom an ovarian cyst burst into the intestinal canal; for several years afterwards she was subject to occasional returns of the disease, but ultimately recovered.

I have known a person die from suppuration of an ovarian cyst.

The injection of an ovarian cyst has been occasionally practised with success; but it has also failed; so that its salutary influence remains in doubt. Injection of the cyst.

Removal of the cyst.

The removal of an ovarian cyst from the abdomen might be performed in the early stages of the disease by making an opening into it, discharging its contents, and by dividing the membranous bag from its natural adhesions.

OF PARACENTESIS OF THE THORAX.

When required

This is required for accumulations of matter within the cavities of the pleuræ, or matter partially encysted in those cavities. With respect to a collection of water in the thorax, I have only once known an operation performed for it, which proved unsuccessful; the effusion of serum being only the effect of some more formidable disease.

OF EMPYEMA.

Causes.

Collections of pus in the chest are the result of inflammation of the pleura, or of the pericardium; but as the latter does not admit of relief, I skall only describe the former.

Symptoms.

The formation of matter in the cavity of the pleura is preceded by the usual symptoms of pleuritis—viz. pain in the side, cough, a hurried breathing, and imperfect expansion of the thorax; these are succeeded by rigours and greater dyspnœa, by a frequent, small, and often irregular pulse; and if the disease be confined to one side, the patient can only rest on one side. When the sides of the thorax are accurately compared, the diseased is found to be considerably larger than the sound side; the upper part of the abdomen is also much fuller on the side affected; a tense and elastic swelling may be felt there, varying with the state of respiration.

A swelling of the legs succeeds from the pressure of the accumulated fluid affecting the free circulation of the blood through the lungs, as well as altering the position of the heart.

Spontaneous cure.

Nature occasionally performs a cure, in the following manner: The intercostal muscles give way to the pressure of the matter, or

an ulcerative process is produced, by which the pus escapes to the outer side of the ribs under the integument, which at last also ulcerates, and thus the matter becomes discharged.

I was sent for to Miss B—, in Chatham Place, Blackfriars, to meet her medical attendant, Mr. Murley, on account of her being under the following circumstances. She had great dyspnœa, severe cough, a quick small pulse, great emaciation, and hectic flushes, succeeded by rigors. When I examined her left side, I found a large swelling in the situation of the spleen, and another, about the size of a walnut, between the third and fourth ribs; when I pressed upon the tumour in the situation of the spleen, that between the third and fourth ribs became enlarged, so that there was evidently a fluid fluctuating between the two swellings. Thus I found that the enlargement on the left side of the abdomen was occasioned by a descent of the diaphragm from accumulation of fluid in the chest, and I did not hesitate to advise that an opening should be made into the small and circumscribed swelling between the ribs. Case.

This being done, an immense flow of matter immediately succeeded; and when the swelling in the region of the spleen was pressed, the flow increased. After a very long continued and copious discharge, this young lady recovered, and now enjoys good health.

I attended a young lady in Seymour-street under exactly similar circumstances, and she also recovered from the same plan of treatment. These abscesses would of themselves soon have burst, but I thought it better to save the constitution by aiding the efforts of nature. Case.

It frequently happens, however, that the accumulation of pus in the thorax is not accompanied by a partial swelling between the ribs, and under these circumstances the surgeon must be guided in his judgment by the symptoms I have described. In this case, it will be required to make an incision into the thorax without any well marked circumstance in the disease, to direct the situation of the opening. The surgeon will then consider in what place the The pus does not always point externally.

wound will be the most dependent, so that the matter may readily escape.

Operation.

As the patient should be in the sitting position at the time of the operation, the lower part of the chest should be selected between the seventh and eighth, or eighth and ninth ribs, and the opening should be made rather posteriorly to the side of the thorax, so as to completely avoid the diaphragm. The skin being drawn up an inch, an incision is to be made through it upon the upper edge of the rib; after which, the intercostal muscles are carefully divided; and a straight canula closed at its end like a catheter, but having holes in its sides, is then passed through the pleura, and the pus is allowed to escape through it. When the matter has been thus evacuated, the canula is removed, and the skin being let go, the external and internal wounds are no longer opposite to each other, and union is more readily effected.

The reason for making the incision upon the upper edge of the rib is to avoid the intercostal artery, which is placed in a groove in its lower margin.

Sometimes succeeds.

This operation I have known succeed, although it is generally unsuccessful.

Case.

A Mr. Bryant, in the city of London, had this operation performed upon him, by Sir B. Harwood, and he ultimately recovered.

Spurious empyema.

Collections of pus in the thorax are sometimes partial, and then the disease is called spurious empyema.

How produced.

An adhesion forms between the pulmonary and costal portions of the pleura, between which also matter becomes deposited, so that the general cavity of the chest is excluded from the accumulation. This abscess ulcerates the intercostal muscles, and breaks externally, after having been the occasion of excessive pain, dyspnœa, and cough.

Case.

A boy, who had been a long time at sea, and who had been very much the subject of sea-scurvy, was sent to my house by his mother, on account of a large accumulation of matter upon the

left side of his thorax, a part of which passed to and fro between the ribs, and projected very much if he made a deep inspiration, or coughed. Seeing him in ill health, I was fearful of making an opening, but advised him, on account of his scurvy, to take bark with sulphuric acid: under the improvement of his general health which this treatment effected, the matter became entirely absorbed, and the boy perfectly recovered.

The treatment of spurious empyema is that of common abscess, viz. fomentations and poultices; and the opening is to be left to nature or performed by art, as the constitution is able or unable to bear the process of ulceration. Treatment.

LECTURE XXXVI.

OF HARE-LIP.

This is a congenital fissure in the upper lip, which resembles the form of the lip of the hare. Definition.

But the deficiency of the lip and palate is liable to great varieties. Many varieties

First, It is frequently a simple fissure, extending from the edge of the lip nearly to the nostril. Simple fissure.

Secondly, It is sometimes more extensive, and is accompanied with greater separation, when it enters the nostril. Entering the nostril.

Thirdly, The defect occasionally exists on each side, and extends into both nostrils. Double fissure.

Fourthly, The fissure is not confined to the lip, but extends into the superior maxillary bone, and sometimes along the whole of the superior maxillary and palate bones, and through the velum palati. Extending through the bone.

Fifthly, A fissure is sometimes seen opposite each defect in the lip, which extends through the maxillary and palate bones, leaving an insulated portion of each of these bones in the centre. Double fissure extending through the bone.

Fissure only in the palate.

Sixthly, The defect in the palate is in some cases a circular opening, either in the bone or in the velum palati only.

Cause.

As to the cause of this defect, it may be remarked that such deficiencies are more frequently observed in the median line of the body than in any other parts. The body is constituted in the greater part of two halves rather than of one whole; thus it is obvious, that the brain and nervous system of one side of the body is distinct in its functions from the other side; as for example, in cases of paralysis, the nervous defect is confined often to one half of the body.

I have seen a child born with half its face; its arm and leg on one side much larger than on the other.

With regard to the organs of sense, they are each of them double. In the organs of smell and taste, although less apparently double than those of sight, hearing, or feeling, yet the function of one half of the tongue and one half of the nose may be lost, and the other half remain perfect.

It is at the median line that the union of the two halves of the body may be said to be produced: there it is that the nerves unite, and the blood-vessels inosculate; and from deficiency in that inosculation arises the defects which are so frequent in the central line of the body, viz. the defects in the lip and in the palate; a want of the sternum; a deficiency of the linea alba to a great extent; also of integument, pyramidal muscles, and fore part of the bladder; the prepuce imperfectly formed at the frænum; an aperture in perineo in the male giving the appearance of the hermaphrodite.

Exceptions.

The exception to this rule is in the abdominal viscera, which are supplied by azygos branches from the aorta and by nerves from the ganglia.

Contrary effects.

On the other hand, the inosculation in some instances is unusually free, producing a closure of the anus, or of the pudendum in the female.

Fissure in the lip easily cured.

The congenital defect in the lip may be readily repaired by the process of adhesion, and this becomes desirable not only on account

of the disgusting deformity which it produces, but also from its influence upon the nourishment of the child, its food returning by the unnatural aperture in the attempt to swallow it. The edges of the fissure in the lip are therefore pared away, the raw surfaces are preserved in complete contact, inflammation arises, adhesive matter is infused, and vessels shooting into the adhesion produce a living union of the parts.

Proper age for an operation.

It becomes a question of importance, at what period of life the operation should be performed, whether immediately after birth, at from three to six months of infancy, or after dentition is completed.

It is undoubtedly true that adhesion is most sure to be lasting after the period of dentition, and that this operation, therefore, scarcely ever fails when performed between two years and the adult age; on the contrary, during dentition it is attended with some danger, and sometimes the adhesion is destroyed by the violent efforts of the child; soon after birth the operation often fails, and is attended with considerable danger.

Case.

Of the proof of the danger during the period of dentition, I will mention the following case. A child of a clergyman, of more than six months of age, was sent to me from the country to be submitted to this operation. I advised that it should not be performed, but the answer was that the mother could not bear to see the child with this deformity. I operated; the child became feverish, the gums inflamed, and an incisor tooth partially made its appearance; the child was attacked with purging of the most severe kind; and, on the fifth day following the operation, it died.

Danger soon after birth.

The danger, however, is much greater if the operation be performed soon after birth; the nervous system is then so exceedingly irritable, that convulsions are readily produced, and the loss of a small quantity of blood occasions a fatal influence.

Case.

I was operating, at Great Yarmouth, upon an infant with hare-lip in the presence of Dr. Girdlestone, when he said, "Have you no fears of the child's dying?" to which I replied, "I never saw one die from this operation;" he told me that he had witnessed an

operation upon a child, which was soon after seized with convulsions, and of those convulsions it died.

Case. I was requested by Mr. Price, surgeon, in Tower Street, to see a child, born the preceding day with hare-lip. I performed the operation, the infant lost but little blood; on the following day, when I called upon Mr. Price to accompany him to visit the child, he informed me that it was just dead, and that it had lived only twenty hours after the operation.

Case. An infant was brought to my house in Broad Streeet, with hare-lip. I operated upon it upon a Monday, and desired that it might be brought to me upon the Thursday; the mother called upon the Thursday to inform me that the child was dead.

Case. During the year 1824 an infant was brought to my house, with a hare-lip of the most simple kind, and its parents were determined to have the operation performed: this was done upon a Monday morning; on the Tuesday the father of the child came to my house, and said, "Sir, my child vomited very much last night, and is this morning in a state of stupor." I directed him to give the infant some calomel, and put it in the warm bath; I called at the house in the evening, when I found that the child was dead.

Thus the danger at the infantile period is considerable, and the operation also often fails when the life of the patient is not endangered. Case. I operated, in the presence of Mr. Cline, upon an infant, the daughter of the marshal of the King's Bench, but the lip flew open when the ligatures were removed.

Case. I was requested to perform this operation upon a boy about twelve years of age, who had been operated upon in his infancy by one of the first surgeons in the city of London, yet the union had been so imperfect that a second operation was demanded.

Practical conclusions. The conclusions, therefore, as far as my own experience dictates, are these: That prior to six months there is danger of a want of union, and even of the loss of life; that from six months to two years, during the period of dentition, the operation should not be performed; that, after dentition is completed, there is little

risk of failure either as regards the union of the lip, or the life of the child.

Nothwithstanding I feel it my duty to mention these adverse circumstances, yet I have known the operation performed, and have performed it myself in infancy, with very complete success; and in those cases in which a fissure has existed in the upper jaw, the union of the upper lip has, by its pressure upon the bone, led to an approximation of the edges of the fissure so as to produce considerable advantage by the early operation.

Sometimes an early operation beneficial.

The operation may be performed with a simple interrupted suture or with pins. Mr. Cline, who had great experience in his profession, preferred, and in his lectures recommended, the former. The truth is, that it may be very successfully performed with either; but the interrupted suture is the most simple, and, as far as I have seen, equally effectual; it has this great advantage, that it prevents the disturbance to the adhesion, which the lip receives in the removal of the pins.

Two modes of operating.

The steps of the operation are as follows: The child is to be recumbent with its head placed over a pillow, the surgeon then extends the lip from the nose, and if any adhesion to the gum prevents its being extended, such adhesion must be first divided; he next introduces a pointed and curved bistoury, at the angle of the fissure, carries it down to the red edge of the lip, and thus removes the surface from one of the sides; the removal of the opposite surface is effected from the angle of the fissure in the same way. A straight needle armed with a waxed silk is afterwards passed through each side of the lip, at the juncture of the skin with the red part, and about the eighth of an inch from the raw surface; then another needle and ligature being introduced through the integument, half way between the first suture and the angle of the fissure, the edges of the fissure are brought together by tying the portions of silk, the lower one should be secured first; and when both are tied, the ends of the silk are to be cut off above the knots, and thus the operation is concluded. There is not any necessity for applying adhesive plaster; and the more the part is exposed to the

Operation.

Bleeding.

air, and the more dry it is kept, the better. The coronary artery of the lip bleeds freely in the operation, but it ought not to have a ligature applied to it, as when the sutures are tightened the orifices of the artery become sufficiently compressed to prevent hæmorrhage.

Removal of the sutures.

The general rule for the removal of the sutures is on the fourth and fifth days. On the fourth day take away the upper thread, and upon the fifth day the inferior one; but although this is the general rule, yet if there be much inflammation or tendency to suppurate about the sutures, both should be romoved on the fourth day.

After treatment.

After the removal of the sutures, it is best not to apply any plaster unless the adhesion be incomplete at any part, and then a very narrow and long strap may be carried from cheek to cheek across the lip.

Caution in giving food.

In giving the child food after the operation, it should be done in such a manner as not to disturb or moisten the lip.

Mode of using pins.

If pins are employed, they are to be introduced at the same part of the lip as the sutures, and then the ligatures are to be twisted over their ends in the figure of an ∞. The pins should be of silver or gold, with steel points, which points admit of easy removal; great care is required when taking away the silk and pins, that the adhesions may not be disturbed; this is to be done at the same period after the operation, as when sutures are used.

Fissure in the bone.

A fissure in the bone accompanying that in the lip, makes no difference in the mode of performing the operation, but renders its success more doubtful, from the want of support by bone which the lip would otherwise receive. In general also, in this case, the fissure in the lip extends into the nostril, and it requires great care on the part of the surgeon to produce a union of the upper part of the fissure without deformity.

OF THE DOUBLE HARE-LIP.

Two fissures in the lip

If there be a fissure on each side extending through the lip,

without any imperfection in the bone, the operation is performed in the same manner as when the fissure is confined to one side, but at successive and distant periods, so as to allow time for the complete adhesion and union of one side, before the second operation be attempted.

A fissure in the bone sometimes accompanies each fissure of the lip, and then a projection of the insulated portion of bone occurs, in some instances, almost to the extremity of the nose. Extending through the bone.

The operation may be then performed by removing, or not removing, the projecting bone. I have successfully removed the projecting portion of bone, uniting the lip at a future period; but there was this objection to the mode of relief, that the upper lip did not project as usual from the want of that portion of the jaw and teeth, and an artificial jaw was required to form a support: it is better, therefore, to perform the operation upon each fissure of the lip, by uniting the skin upon each side, to that which remains upon the projecting bone, and to depend upon the modelling process of growth for the gradual diminution of the projection; the operation being the same as that which is necessary for the simple fissure. After the union of the lip, the diminution of the bony projection may be assisted by gentle pressure. Operation.

DEFICIENCY OF THE PALATE.

When there is an aperture in the bony palate, the person suffers a twofold inconvenience: First, in a nasal pronunciation; Secondly, in the passing of the food, particularly liquid, into the nose. Inconvenience of.

If the opening be confined to the bony palate, there are two modes of relief, one by the patient's wearing an artificial palate, the other by operation. Two modes of relief.

The most simple of the artificial palates was made for me by Mr. Wiess, in the Strand, which consisted of two plates of silver connected together in the centres by an axis, so that the one could Artificial palates.

be turned upon the other by means of a key; thus when introduced, it could be easily fixed. Mr. Wiess showed me one of the same form, of elastic gum. A plate of silver, with two springs which passed through its centre, so as to expand when pushed up, would answer the same purpose. The common contrivance is a piece of silver, and a sponge connected to it by a chain or stem; the sponge being passed into the nose through the aperture in the palate, there expands by the moisture, and fixes the silver plate against the opening, but the animal fluids in the sponge soon become putrescent, and render the breath extremely offensive.

A portion of membrane from the roof of the mouth might be partially pared off, and turned over the opening, its circumference being placed in contact with the edges of the aperture so as to produce adhesion; but of this operation I have not any experience.

For a circular deficiency in the velum palati, an artificial palate of elastic gum will answer best.

Operation for division of the soft palate.

An operation similar to that for hare-lip, has been performed for a congenital division of the soft palate. Mr. Cruickshank tried it and failed; M. Roux, of Paris, and Mr. Alcock, of London, have since been successful.

CANCER LABII.

Its commencement.

This disease wears two different appearances in its commencement. It sometimes assumes the character of a warty excrescence, at others, it is an ulcerated fissure in the lip attended with surrounding hardness.

At first begins in a wart.

When it is at first a wart it is covered by an incrustation, upon removing which an elevated and ulcerated surface is exposed with surrounding hardness. A fresh incrustation forms, additional growth takes place in some parts, and ulceration in others, until at length a considerable projection is produced. When the incrustation is now removed, the surface freely bleeds, luxuriant granulations appear in some parts and deep depression in others. It extends

more upon the red part of the lip than upon the surrounding skin, though ultimately the latter becomes affected. It is very little tender to the touch, so that the patient handles it with great freedom; but it is occasionally accompanied with darting pains.

When it begins as an ulcerated fissure in the lip, the surrounding part is hard, an incrustation is afterwards produced, and ultimately the disease has very much the same appearance as when it begins as a wart. It gradually ulcerates the skin towards the chin, and although beginning in a small spot, at length involves the whole lip. At first begins as a fissure.

The character of the sore is that of a cancerous ulcer, its edges being everted, and its surface hard; a gland under the jaw next becomes affected between the symphysis and angle, and sometimes the glands on both sides: the gland is hard and at first not painful, then the surface assumes a livid appearance and becomes occasionally acutely painful; at length it ulcerates, discharges a bloody serum, bleeds frequently, the edges of the ulcer are everted, the ulceration becomes extensive, and the surface of the sore very irregular; several other glands in the neck become affected, difficulty of breathing and of deglutition ensue, and the patient falls a victim to the disease after a long period of suffering. Character of the sore.

Some persons deny that the character of this sore is cancerous, but upon what principle I cannot understand, for it is unequal upon its surface, it has irregular, callous, and everted edges, it is accompanied with lancinating pains, it extends its influence to the neighbouring absorbent glands, and when a section is made of it, after its removal, its internal appearance is truly scirrhous. Its cancerous characters.

I have seen at least two hundred cases of this disease in the under lip, and have only witnessed one in the upper. It is a very rare disease in the female; it is a complaint of age more than of youth, occurring most frequently from fifty to seventy years. Rare in the upper lip. Or in the female.

A great many of the persons in whom I have seen this disease have attributed it to the custom of smoking, believing that the tobacco pipe was instrumental in its production; but I have frequently seen it in persons in whom it could not be attributed to Supposed cause.

that cause. It seems to be much more a local disease than cancer in most other parts of the body; the general health often appearing extremely good.

OF ITS TREATMENT.

Escharotics.

In the early stages of this disease the sore may be destroyed by the application of arsenic, which occasions it to slough; it might be also destroyed by the actual cautery, but in the very earliest stages it is most prudent and judicious to remove it by the knife.

Removal by the knife.

The operation should not, however, be performed if a gland under the jaw be enlarged, as the disease is then sure to return; but if the gland be not diseased, the result of the operation is much more successful than for scirrhous tubercle in the breast.

Medicine useless.

No local applications short of those that destroy the part, or any form of internal medicines, are found to be useful.

Operation.

The operation is performed in the following manner: An assistant puts a finger into each angle of the mouth, and stretches the under lip to its utmost extent; the surgeon then makes an incision on each side of the disease, so that a triangular portion of the lip is thus removed.

Hæmorrhage.

The coronary arteries bleed freely, but do not require to be secured; but when the inferior labial artery is formed on each side, by a large mental branch, I have found it necessary to secure that vessel at the inferior angle of the incision.

Sutures.

Three ligatures are then required to bring the edges of the wound together: one at the red edge of the lip, and two others at equal distances, in the remaining part of the wound. These are to be passed through the lip by means of a straight needle, as in the operation for hare-lip. Some pressure is afterwards required, to assist in the arrest of the bleeding from the coronary arteries; the patient using a sponge for that purpose.

Two-thirds at least may be thus removed, and yet a good lip be afterwards formed. The ligatures are to be removed on the fourth and fifth days, the upper ligature being left to the fifth day.

It is a folly in this operation not to encroach upon the sound rather than upon the diseased part.

OF THE OPERATIONS FOR TIC DOULOUREUX.

Nature of the morbid change not known.

Of the nature of that change in the nerve which produces this disease I have no knowledge, as I have never had an opportunity of dissecting a nerve which had been affected with it.

Appears to be an action under par.

To me it has always appeared, that it is an action under par, rather than an inflammatory action on the nerve, and for this obvious reason, that the remedies found successful in it are those of a tonic kind: large doses of bark, the free administration of arsenic, but above all, the remedy recommended by Mr. Hutchinson, of large doses of steel, are the evidences in support of this opinion. Opium, belladonna, and other narcotics, have only a temporary influence in mitigating suffering. As local applications, I have known belladonna and an ointment of the subacetate of lead beneficial.

Sometimes originates in the brain.

But this disease sometimes appears to originate in the brain itself, as I have understood was the case in my friend Dr. Pemberton, who suffered more from this disease than any individual I ever witnessed, and in whom a portion of bone was found growing on the brain.

Division of the nerve.

The operation of dividing the nerve for this disease is sometimes anxiously called for by the patient, on account of his agonizing sufferings; I have seen an old weather-beaten captain of a man-of-war cry like a child under the painful influence of this disease; and a female once said to me, after the division of the nerve, "Sir, the operating table was a bed of roses in comparison with the agony which the complaint had produced."

The nerves commonly divided.

The nerves which I have divided, have been the suborbitary, the frontal branches of the ophthalmic, the mental nerve, and the portio dura of the seventh pair, which is perhaps more frequently the seat of this disease than any other nerve in the body.

Operation very simple.

The operation is extremely simple, and is performed in the following manner upon the suborbitary nerve. The ridge at the

Division of the suborbitary.

lower part of the orbit being felt, the foramen through which the nerve passes is situated from a quarter to half an inch below the centre of that ridge. The point of a curved bistoury is then passed into the cheek three quarters of an inch below the ridge of the orbit, and to the outer side of the foramen, and is carried directly to the bone; then passing it upon the surface of the bone under the nerve, and a little obliquely upward towards the inner canthus of the eye, the point of the knife is brought to the back of the skin at the distance of an inch from where it entered; it is then kept elevated against the back of the skin as it is withdrawn, and the nerve is thus freely divided by an opening through the skin, not above half the size of that which is made in bleeding.

Pressure with the finger is for a few minutes required, to stop the bleeding from the suborbitary artery.

Division of the frontal branches.

The operation from the frontal branches of the ophthalmic is performed in a similar manner; as these branches radiate more at the upper part of the orbit, it is necessary to make the division a little more extensively than in the former case.

The eyebrow is drawn up, and the point of the curved bistoury is to be introduced under it, and carried on to the ridge of the orbit, extending to the outer side; afterwards carried inwards close to the bone towards the upper part of the nose, the point is elevated to the skin, and withdrawn close to the back of it, out of the opening by which it was introduced, by which all the branches are divided.

Division of the mental nerve.

The operation upon the mental nerve is different to the two former; the foramen in the side of the lower jaw, through which this nerve passes, is situated in a line drawn below and between the two bicuspides; and the pain of the disease in the nerve is felt in the under lip, and the lower part of the side of the face.

In this case, to divide the nerve, the under lip is drawn from the gum, and the point of the curved bistoury is introduced through the skin of the mouth close to the jaw, on the fore part of the foramen, and is then carried backwards close to the bone, dividing the skin of the mouth and the nerve as it passes out of the foramen,

the incision being about three quarters of an inch in length; pressure is afterwards required for a short time over the foramen to stop the hæmorrhage from the artery which accompanies the nerve.

Division of the portio dura.

I have only once divided the portio dura of the seventh pair of nerves for this disease. I laid bare the branches of this nerve anteriorly to the parotid gland, carefully avoiding its duct, and passing a director under the nerves, divided many of the branches, paralyzing that side of the face, the mouth being drawn over to the opposite side; a few days after the operation erysipelatous inflammation succeeded, with a very high degree of fever, of which this woman died.

Operation seldom succeeds.

In the various operations which I have performed for this complaint, I recollect but two cases in which the operation completely succeeded.

Affords temporary relief.

For three or four months the patient is relieved from suffering, but then the disease returns; and it is curious, that it is reproduced whilst the numbness of the lip consequent upon the operation still remains. I have divided the nerve a second and a third time whilst the numbness was remaining in the lip, produced by a preceding operation.

Removal of a portion of the nerve.

It has been said, that removing a portion of the nerve prevents the pain from returning; but a person who had submitted to this operation informed me, that he had caustic applied upon the extremities of the divided nerve, yet he consulted me for the returning disease.

With respect to the operation for the disease, it ought to be performed rather at the earnest desire of the patient than by recommendation of the surgeon.

AURA EPILEPTICA.

Case.

For this disease, I have only once had occasion to perform an operation. The case was sent to Guy's Hospital by Mr. Masters, surgeon, at Watford. The man had received a severe blow on his

thumb, after which he had the following symptoms, which had lasted for several months: uneasiness in the parts; pain extending up the arm in the course of the radial nerve; also to that side of the neck, accompanied, by a rotatory motion of the arm inwards; occasional loss of sense and volition, so as to occasion him to fall, but without any struggle; he remained insensible for a few minutes and then recovered, excepting that the attack left some pain in his head. As the man had recourse ineffectually to a great variety of internal remedies and to electricity, I recommended him to submit to the division of the nerve, and making an incision upon the outer side of the radius, opposite to the insertion of the supinator radii longus, I laid bare the nerve, and putting a director under it, I removed a portion, which measured, after its removal, five-eighths of an inch. The man had some slight attacks of the complaint afterwards, but on his return to Watford, Mr. Masters informed me that he entirely recovered.

LECTURE XXXVIII.

ON AMPUTATION.

Less frequent than formerly.

THE removal of constituent parts of the body becomes necessary from different causes, but such operations are much less frequently performed at present than they were thirty years ago.

Improved treatment of compound fractures and dislocations.

The improved treatment of compound fractures renders it rarely necessary to amputate a limb for those accidents. A compound dislocation of a large joint, a few years back, led the surgeon to condemn the limb to amputation, but it is now no longer generally believed to require it. There will, however, be cases in which an operation will be occasionally required for one of these accidents.

Of aneurisms and diseases of joints.

An aneurism in a limb, for which, forty years ago, amputation of the limb was frequently performed, is now, by the simple operation invented by Mr. Hunter, readily and effectually cured. The simple

chronic and scrofulous enlargements of joints were formerly often deemed to require the operation of amputation, but rest, external irritation, alterative medicines, and a nutritious diet, now generally do away with the necessity of having recourse to so direful an expedient.

Extensive ulceration of a limb is now much more frequently cured than formerly. The treatment of the diseases of bones is much better understood, and the result, although tedious, is rarely unsuccessful. Of ulcers and diseased bone.

In gangrene, considerable portions of the feet, or of other parts, will separate by the efforts of nature, often producing as perfect a cure as the surgeon is able to effect by operation. Natural separation of parts.

Amputation will still be occasionally necessary for the accidents and diseases I have mentioned: for laceration of limbs from machines; for the effects produced by the bursting of fire-arms; for some cases of gun-shot wounds; for chronic and scrofulous complaints, and for malignant diseases of a cancerous or fungoid nature; also for deformities which are either congenital or the result of organic change, and for exuberant growths, as tumours. Operation sometimes necessary.

All that I wish to advance upon the subject is, that although the necessity for this operation still exists, that the number of amputations thirty years ago was much greater than of those of the present day.

Amputation is not only much less frequent than formerly, but it is an operation of infinitely less danger. The extensive surface of wound left after the old operation, and filling the wound with charpie or flour, led to the highest degree of constitutional irritation; whilst now, the integument being brought over the wounded surface, directly produces a process of adhesion, by which the constitutional disturbance becomes lessened and the danger from the operation greatly diminished. Much less dangerous than formerly.

I shall now proceed to describe the various amputations which are required at different parts of the limbs.

The common amputating instruments are so well known, that I need not enter into any particular description of them, but I shall

mention those proper to be used in each operation, when I give an account of the mode of performing it.

Application of the tourniquet.

Of the various tourniquets, I prefer that of Petit, which is generally employed at the Borough Hospitals. In applying this tourniquet, the pad should be placed immediately under the plate to which the screw is fixed, by which the screw is made to act more effectually on the pad. That part of the limb upon which the tourniquet is to be placed should be first surrounded by a piece of soft linen to prevent the tape, when tightened, from cutting the integument. In the thigh it should bo placed a little above the middle, where the artery passes nearest to the bone; and in the arm, one-third of the length of the os humeri from its head on the inner side the biceps.

Artery compressed without the aid of a tourniquet.

When amputation is required at the upper part of the thigh, the termination of the external iliac artery in the femoral is to be compressed upon the edge of the pubes by an assistant, who puts one of his thumbs over the vessel, and the other thumb upon the first, which is our usual mode. If the amputation be performed high in the arm, the assistant is either to press the axillary artery with his fingers against the head of the os humeri, or else the subclavian upon the first rib, by means of the ring of a key or a pad, passed behind the clavicle.

OF AMPUTATION OF THE FINGERS.

In removing a portion of a finger at the second or third joints, the operation is, I think, best performed in the following manner:

Instrument.

The only instrument required is a common pointed scalpel.

Operation.

The finger being extended, the integument is cut through by a circular incision about half an inch beyond the joint, and a lateral incision is to be made on each side in the direction of the lateral ligaments, extending from over the joint to the circular cut; the portions of integuments are to be raised from the flexor and extensor tendons below and above as far as the joint, making two

flaps; after which the tendons and one of the lateral ligaments are to be divided, when the joint may be easily dislocated, and the separation of the part readily completed.

Vessels.

The vessels divided in this operation seldom require the application of a ligature, the pressure from the dressings being usually sufficient to prevent any hæmorrhage.

Dressings.

The flaps of the integument should be brought together, and kept so, by a narrow slip or two of adhesive plaster passed over the extremity from the dorsal to the palmar part, and these strips should be secured by a circular portion a little above the stump. The hand and fore-arm should be supported by a sling until the stump has healed.

Another mode of operating.

The operation of amputation may be performed at either of these joints, by making a single flap from the palmar part. In doing this, the joint must be flexed, when the scalpel is carried through the integument on the dorsum of the joint, and through the joint itself, dividing the ligaments at one cut; the knife is then passed under the phalanx, which is to be amputated, and a flap of sufficient extent is separated from the palmar side.

Not always practicable.

This mode of amputating is more expeditious than that first described, but it is not applicable to those cases in which the finger is straight and the joint stiffened from disease, as the knife cannot be then introduced into the joint from the back part; there is also much difficulty in separating the flap without including part of the flexor tendons; and, upon the whole, the union of the divided parts is not so easily accomplished.

Applicable to the toes.

These operations are equally applicable to the same joints of the toes.

Amputation of a whole finger.

When it is necessary to remove the whole of a finger, I think it better to saw off the extremity of the metacarpal bone, rather than to open the joint. If the middle or ring finger be thus removed, less deformity results from the operation, as the remaining fingers approximate much more than when the extremity of the metacarpal bone is left; if the fore or little fingers are amputated in this manner, an ugly projection is prevented, which

would not be of any utility if suffered to remain. The wound also unites more readily, than that which is produced by the amputation through the joint.

Instruments. The instruments required in performing this operation are, a common pointed scalpel, and a metacarpal saw; and my metacarpal saw moves upon its axis, so that it can be made to cut in any direction.

Operation. The finger to be amputated being extended and separated from the others, two incisions are to be made through the integument, which meet at an angle over the dorsum of the metacarpal bone, at a short distance below the digital extremity, and terminate on each side of the first phalanx at the natural separation of the fingers; two other incisions of the same form and extent are to be made on the palmar side, which are to join the former between the fingers; the scalpel is then to be passed down on each side of the extremity of the metacarpal bone, so as to divide it completely from its lateral connexions, and the extensor and flexor tendons are also to be cut through at the point of the first incisions; this being accomplished, the blade of the metacarpal saw is to be introduced between the bones, and the extremity to be removed is to be carefully sawn off.

Dressing. The edges of the wound are to be brought into contact, by binding the fingers on each side of it together, when the hand and fore-arm are to be supported by a sling, as after the former operation.

Operation of the fore or little finger. In amputating either the fore or little finger, only two external incisions are required, which should begin at a point below the extremity of metacarpal bone, as in the other case, only over the centre of that side which is outermost, and extend one over the joint and the other under it in an oblique direction, so as to meet between the fingers; two flaps are then to be raised, so as to expose the extremity of the metacarpal bone; the separation of which is to be completed as before described. The edges of the wounds are to be brought into contact by the application of adhesive plaster, and the arm to be supported.

If the vessels which are divided in any of these amputations afford a troublesome hæmorrhage, which cannot be readily checked by pressure, it will be proper to secure such vessels by ligatures, before the edges of the wound are finally approximated; and after any amputation, when a ligature has been applied upon an artery, one of the ends of the silk should be cut off a little beyond the knot on the vessels, as it is perfectly useless, and, if allowed to remain, only tends to increase irritation. Application of ligatures to the vessels.

When it becomes necessary to remove any of the toes, they should be amputated at the joint in preference to separating the extremity of the metatarsal bone; because it is desirable to preserve the width of the foot and support of the body, which would be diminished by the removal of part of the metatarsal bone. Toes to be amputated at the joints.

The operation may be performed in the same way as that last described for the removal of the fingers, excepting that the incisions should not reach beyond the joint, which should be opened from the side, as in the amputations at the second and third joints. Operation nearly the same as before mentioned.

After any of these operations upon the toes, the patient should observe the recumbent posture, until union of the edges of the wound has been effected. After-treatment.

Amputation should be performed through the metacarpal or metatarsal bones, when all the fingers or toes are so much injured as to require removal; it is much better than amputating through the carpal or tarsal bones, as, in the hand, the patient afterwards derives great advantage from the use of the carpus, which is thus preserved; and, in the foot, the insertions of the tibialis anticus, with those of the peroneus longus and brevis being uninjured, the remaining part of the foot is much more useful, than when the metatarsal bones are entirely removed: in either case the wound unites sooner than when the articulations are exposed. Amputation through the metacarpus or metatarsus.

In some cases, if the injury or disease does not extend to all the metacarpal or metatarsal bones, only such as are injured or diseased should be amputated. Thus, in the hand, the thumb with its metacarpal bone alone may be removed, or all the fingers with their Portions of the hand removed.

metacarpal bones may be amputated, the thumb being allowed to remain; the middle and ring fingers, the ring and little fingers; or the middle, ring, and little fingers with their metacarpal bones, may, in like manner, be separated from the others.

Of the foot.

In the foot, the great toe and its metatarsal bone may be amputated from the others, or the others from it; or the second and third, the third and fourth, the fourth and fifth; or the third, fourth, and fifth may be removed together with their metatarsal bones.

Case.

In one instance I removed the middle and ring fingers with their metacarpal bones; approximating the fore and little fingers, which were not injured by bandage. The patient recovered quickly, having perfect use of the remaining portion of the extremity.

Case.

I also, in another patient, amputated the thumb and the three inner fingers with their metacarpal bones, leaving only the fore finger, which was infinitely more useful than any artificial hook could have been.

Cases.

The metatarsal bone of the great toe I have several times had occasion to remove; and Mr. Key has amputated the four smaller toes, with their metatarsal bones, the two outer cuneiform, and the os cuboides, sucessfully; leaving the os calcis, astragalus, navicula and internal cuneiform bones of the tarsus, with the metatarsal bone of the great toe and the toe itself.

OF AMPUTATION THROUGH THE CARPUS.

Instruments.

The only instrument required is the catling.

Application of the tourniquet.

Before commencing the operation, the tourniquet should be applied on the upper arm.

The patient being seated in a chair, the surgeon first makes a circular incision through the integument, just over the bases of the metacarpal bones, which should include more of the integument upon the back of the hand than towards the palm; he then dissects the skin back as far as the styloid process of the radius; the integument is held back by an assistant, whilst the surgeon takes hold of the hand he is about to remove; and, feeling for the

extremity of the styloid process of the radius, he passes the catling into the joint between the radius and scaphoid bone, by dividing the external lateral ligament; and he completes the amputation by carrying the knife through to the inner side of the carpal joint.

It will be necessary before dressing the stump to secure the ulna and radial arteries by ligatures. Vessels.

The edges of the integument are to be brought together over the extremity, and retained in contact by means of straps of adhesive plaster, passed from the flexor to the extensor muscles, and these straps are to be confined by a circular piece, after which the arm is to be supported in a sling, or upon a pillow if the patient be confined to bed. Dressing.

I have known the hand amputated between the first and second row of the carpal bones, but I think it objectionable on account of the number of joints which are exposed. Amputation between the second and third row.

OF AMPUTATION THROUGH THE FORE-ARM.

The necessary instruments are, the catling and the saw. Instruments.

The patient is to be seated, and the tourniquet applied as in the former operation. Position.

The limb being extended, the surgeon commences the operation by making a circular incision through the integument sufficiently high to avoid the numerous tendons at the lower part of the fore-arm; then he separates the integument from the subjacent parts, and turns them back to the extent of about an inch and a half; an assistant keeps this supported whilst the surgeon cuts through the superficial muscles by another circular incision, and allowing a short time for their retraction, he divides the deep-seated layer, and exposes the bones, from which he carefully separates the muscles and interosseous ligament, by passing the catling between and around the ulna and radius at the part on which he intends to apply the saw. The fore-arm is then held in such a position that the surgeon can easily saw through both bones at once, in doing Operation.

which he should make use of the whole of the cutting edge of the instrument, and employ very little pressure, as the weight of the saw itself is almost sufficient. If the ends of the bones have any sharp points projecting from them, which will sometimes happen if they have not been cleanly sawn through, these points should be carefully taken off by the bone nippers.

Vessels.

After this amputation four vessels will generally require to be secured; viz. the ulna, radial, and two interosseal arteries.

Dressing.

The wounds should be dressed as that after the amputation through the carpus, and the same treatment adopted.

Two flaps.

This amputation may be performed by making two flaps, one formed from the posterior, and the other from the anterior part of the fore-arm.

Danger of amputating low down.

I have seen two cases in which inflammation and sloughing of the tendons have followed amputation performed through the lower part of the fore-arm a little above the carpus; they both proved fatal. It is better, therefore, to avoid operating at this part, as little advantage is gained by leaving more of the bones, and the risk is greatly increased.

OF AMPUTATION THROUGH THE UPPER ARM.

Instruments.

The same instruments as used in the last operation are all required.

Position.

The tourniquet should be applied sufficiently high to allow of ample space for the performance of the amputation, and the patient should be seated in a low chair.

Operation.

An assistant extends the arm, and the surgeon first drawing up the integument with his left hand so as to put it on the stretch, divides it by a circular cut with the catling about one inch and a half above the olecranon; he then raises it from the parts beneath to the extent of about two inches, according to the size of the limb, and turning it back, he, by another circular cut, carried close to the reflected integument, divides the superficial muscles, and subsequently the deep-seated muscles down to the periosteum,

and he finishes with the knife by cutting through the periosteum at the part on which he is to apply the saw. The integument and muscles being carefully held back, the saw is applied and the bone divided, when the amputation is completed.

Three arteries will generally require the application of ligatures, viz. the brachial, profunda, and ramus anastomoticus. Vessels.

The edges of the integument are to be brought together by the application of adhesive plaster, and the patient being placed in bed on his back, the stump is to be supported on a pillow, so as to be rather higher than the shoulder. Dressing.

If the skin be loose or the muscles flabby, a roller should be put around the limb to give support to these parts, before the patient be placed in bed. Application of a roller.

It may be necessary in some cases to amputate higher up than I have mentioned, but the steps of the operation will be otherwise the same.

OF AMPUTATION AT THE SHOULDER JOINT.

The only instrument required is a catling. Instruments.

The subclavian artery is to be compressed upon the first rib, from above the clavicle, by an assistant. The ring of a common key covered with some soft linen is a convenient instrument for this purpose. Subclavian artery compressed.

The patient should be seated on a low chair, and the arm to be removed, should be elevated a little from the side by an assistant.

The operation may be performed by making a single flap or two flaps; I prefer the former, but in some cases, on account of disease extending so as to prevent the formation of a single flap, the latter mode should be adopted. Two modes of operating.

In making the single flap, the surgeon raises the deltoid muscle with the fingers and thumb of his left hand, and introducing the catling through the integument, and under the muscle near to its insertion, he cuts upwards close to os humeri as far as the under Operation with a single flap.

part of the acromion process; the integument and larger part of the deltoid muscle are thus raised, so as completely to expose the outer part of the shoulder joint; the arm being then drawn downwards, the catling is passed into the joint at the anterior part, so as to divide the tendon of the biceps muscle, and afterwards is carried round the head of the bone to cut through the capsular ligament: the separation of the limb may be completed either by passing the knife over the head of the bone, and cutting downwards to the axilla, or by placing the knife in the axilla and dividing upwards to the joint; in either case the amputation should be finished by one stroke of the catling.

Vessels.

The axillary artery is to be immediately secured by a ligature, and small branches from the circumflex arteries may be required to be tied.

Operation with two flaps.

When two flaps are required, the first incision extends from just below the point of the acromion downwards, and backwards into the axilla, being curved a little forwards and passing below the insertion of the latissimus dorsi muscle; the back flap is then raised, dividing at the same time part of the deltoid, and the insertion of the latissimus dorsi; the anterior incision through the integument is begun from the same point as the posterior, but carried downwards and forwards below the insertion of the pectoralis major, into the axilla, so as to meet the termination of the first incision; this flap is then raised in part, to expose the capsular ligament, which is to be divided, together with the tendon of the biceps muscle as in the former operation; after which, the head of the bone being dislocated, and the flaps being held back, the catling is passed behind the bone, and the amputation is completed by dividing the remaining portion of the anterior flap together with the axillary vessels, nerves, &c. The artery is to be secured as before mentioned.

Dressing.

After either mode of amputating, the straps of adhesive plaster, employed to keep the edges of the wound in contact, are best applied from before to behind, and should be of sufficient length to keep a firm hold.

In every instance in which I have performed the amputation through this joint, and every case in which I have seen it done, the recovery of the patient has been speedy and perfect. Operation successful.

OF AMPUTATION BETWEEN THE TARSUS AND METATARSUS.

As I think it best to saw off that part of the internal cuneiform bone, which supports the metatarsal bone of the great toe, a saw will be required, as well as a strong catling. Instruments.

A tourniquet should be applied upon the thigh, and the patient should be placed upon a low table in the recumbent posture. Position.

The leg and foot being extended, and fixed by an assistant, the surgeon divides the integument across the dorsum of the foot, commencing at the base of the metatarsal bone of the great toe, and terminating the incision about half an inch beyond that of the little toe; he then makes a lateral incision on each side, so as to enable him easily to dissect up the flap of integument as far as the joints of the four smaller metatarsal bones, and that part of the internal cuneiform which is on a level with these articulations; the extensor tendons being next divided, the four small metatarsal bones are bent downwards, and their ligamentous connexions with the tarsal bones cut through with the point of the catling, after which the internal cuneiform bone is sawn through even with the other tarsal bones: the amputation is completed by passing the catling between the separated bones, dividing the flexor tendons, &c., and forming a flap of about equal size to the superior from the integument on the sole of the foot. Operation.

The anterior tibial on the dorsum pedis, and the two plantar arteries of the sole, will most probably require the application of ligatures. Vessels.

The integument is to be brought over the extremities of the bones, and the edges of the wound kept in contact by straps of adhesive plaster, passed from the sole to the dorsum; the patient is to be placed in bed, and the foot supported by a pillow, until union has taken place. Dressing.

A single flap may be made.

Sometimes a single flap may be made from the dorsum, or sole of the foot, but it does not unite so readily as the double flap.

OF AMPUTATION THROUGH THE TARSUS.

Instrument.

A catling only is necessary in performing this operation.

Position.

The tourniquet must be applied, and the patient placed as in the former case.

In this operation, the navicular bone is to be separated from the astragalus, and the os cuboides from the calcis.

Operation.

The surgeon, having felt for the projecting point of the navicular bone on the inner side of the foot, cuts through the integument about three-quarters of an inch beyond it, straight across the dorsum of the foot, and having made two small lateral incisions, he dissects back the upper flap, and divides the extensor tendons over the articulations, which he then opens, first, by cutting through the lateral ligaments on the inner side, uniting the navicular bone to the astragalus, then the ligament on the dorsum connecting the same bones, and afterwards the ligaments between the os cuboides and calcis, above and externally; the knife being then passed down between the articulations, the inferior ligaments with the flexor tendons and muscles in the sole are divided, and the operation concluded by making an inferior flap of the integument equal to the superior.

Vessels.

The same arteries require to be secured as after the former operation, and the dressing and after position of the patient are to be similar.

Not a successful operation.

From a comparative result of this operation, with that of sawing through the tarsal bones, I am certain the latter produces less irritation and danger than the former.

OF AMPUTATION OF THE LEG BELOW KNEE.

Various modes of operating.

This operation may be performed with a circular incision, and with a single or double flap. I prefer the first, but cases may

present themselves, in which it may be proper to adopt either of the other modes.

Instruments.

In performing the operation with a circular incision, a small amputating knife is usually employed in completing the first step; but a catling is necessary to divide the soft parts between the tibia and fibula; and this, if rather larger than usual, does equally well in the commencement. A saw is also required.

Position.

The patient is to be placed in a recumbent position, on a table, and the tourniquet is to be applied upon the thigh.

Operation.

One assistant holds the leg, and supports it at a convenient height: another assistant grasps the leg just below the knee, and keeps the integument stretched by drawing it towards the thigh, when the surgeon commences his first incision over the anterior part of the tibia, about six inches below the patella, and carrying the knife round the limb, he at one sweep divides the integument, terminating the incision at the point from which he commenced; he next separates the integument from the subjacent parts to the extent of two inches or more, and turns it up, in which position it is retained by an assistant, whilst the surgeon cuts through the superficial muscles, close to the reflected integument; and having allowed these to retract, he divides the deep-seated with the interosseous ligament and the periosteum by passing the catling between and around the bones. The knee being then turned inwards, the saw is applied first upon the tibia, and when this bone has been in part divided, the saw is made to act upon the fibula also, so that the amputation is finished by sawing through the remaining portion of the tibia and the fibula together.

OF AMPUTATION WITH A SINGLE FLAP BELOW KNEE.

May be performed in two places.

This operation may be performed as low down as is possible without interfering with the tendo Achillis, when the patient is desirous of afterwards wearing an artificial leg made of cork, instead of the common wooden one; otherwise the bone should be

sawn off at the same point, as when the circular incision is made.

Instruments. A long catling and a saw will be required.

Operation. The position of the patient, and of the limb, being as when the circular operation is performed, the surgeon feels for the posterior edges of the tibia and fibula, over one of which he places the thumb, and over the other the fore finger of his left hand, the palm resting upon the anterior part of the limb; the extremity of the catling is then introduced immediately below one of these points, and steadily thrust through the calf of the leg, until it protrudes just below the other point, when the blade is carried downwards, so as to form a flap of sufficient size, from the muscles and integument posteriorly; the next step of the operation is, to divide the integument anteriorly, by making an incision commencing at the place at which the catling was thrust in, passing over the fore part of the leg, and terminating at the spot from which the catling was pushed out: the amputation is completed after this, in the same manner as in the common operation.

Operation with a double flap. A double flap is sometimes made from the outer and inner sides of the limb, when the surgeon commences the operation by an incision on the outer part of the leg, reaching from the anterior edge of the tibia to the back of the calf; and having a semicircular form with the convexity toward the malleolus externus, he then dissects back the flap of integument, and afterwards makes a corresponding flap on the inner side, commencing and terminating as the former. The flaps being held back by an assistant, the operation is finished in the usual manner.

Vessels. After either of these amputations, three vessels will have to be secured, viz. the anterior tibial, the posterior tibial, and sometimes the peroneal.

Dressing. It is best in either case to place the straps of adhesive plaster, when dressing the stump, from side to side, rather than from above to below, as, by this, pressure is avoided upon the anterior edge of the tibia, which might otherwise produce much irritation and ulceration.

The patient should be placed upon his back in bed, and the thigh being flexed towards the abdomen, a pillow should be put under the ham, and the stump be allowed to hang over it. The limb should be inclined a little to the outer side. After position

The objections to the operation with a single flap are, that the wound does not unite so readily as that made by a circular incision; and if after-hæmorrhage occurs, which renders it necessary to open the stump, there is a greater difficulty in securing the bleeding vessels; and in debilitated persons, the disturbance of the adhesions is likely to produce a slough of the flap. The anterior edge of the tibia being also more exposed, is more likely to exfoliate, and the subsequent contraction of the flap makes the union tedious. Objections to single flap.

When, however, the integument upon the anterior part of the leg has been destroyed, the formation of a single flap from the posterior part becomes absolutely necessary. Sometimes necessary.

OF AMPUTATION ABOVE THE KNEE.

A large amputating knife and a saw will be required. Instruments.

The patient is to be placed upon a table on his back, and the tourniquet is to be applied high enough upon the thigh to allow of ample room for the retraction of the integument and muscles. Position.

One assistant supports the leg, and another draws up the integument on the upper part of the thigh. The surgeon first cuts through the integument surrounding the limb about one inch and a half above the patella, to avoid the bursa of the rectus, beginning on the superior part over the rectus, and passing the knife round with one sweep to terminate at the same point; he then dissects up the integument for about three inches, and this is kept reflected by an assistant whilst the superficial muscles are divided by another circular cut close to it; the assistant holding the integument, then draws it upwards to assist the retraction of these muscles, after which the deep-seated muscles and the periosteum are cut through so as to expose the bone, which is lastly to be sawn through. Operation.

Vessels.

The following vessels will require the application of ligatures; the femoral branches of the profunda, and sometimes the sciatic.

Dressing.

The integument is to be brought over the end of the stump from side to side, and confined by straps of adhesive plaster, after which the patient is to be placed upon his back in bed, and a pillow should be put under the upper part of the thigh so as to elevate the stump.

OF AMPUTATION AT THE HIP-JOINT.

Femoral artery to be secured first.

In this amputation it is decidedly the safest plan to secure the femoral artery by a ligature at Poupart's ligament, as the first step of the operation.

Mode of doing it.

An incision is begun two inches above the middle of Poupart's ligament and is extended two inches below it: the femoral artery is to be laid bare, and the ligature introduced at the centre of the incision is to be tied upon the denuded vessel opposite Poupart's ligament, and above the arteria profunda.

Operation.

A long catling is then used to make the inner incision through the integument and muscles. This incision is to be begun at the lower part of that which was made to expose the artery, and it is to be carried from thence on the inner side of the thigh obliquely downwards, and is then continued on the outer side of the thigh below the trochanter major to the point at which it began; in this way a larger portion of integument is left to form a covering to the stump than would be produced by a circular incision without obliquity.

In the same line a second incision is to be made to divide the muscles, but the edge of the knife is to be inclined obliquely upwards towards the joint, and the integument and muscles being drawn back, those of the latter which are inserted into the trochanter major should be cut through.

A third incision is to be made to divide the psoas and iliacus internus muscles and the forepart of the capsular ligament, when

the knee being pushed backwards and outwards, the head of the bone is dislocated as far as the ligamentum teres will permit; this being divided, the head of the bone turns completely out of the acetabulum forwards.

A last incision is made by passing the knife over the head of the bone, and behind it, so as to cut through the remaining muscles, &c.

Not the quickest mode.

I am ready to acknowledge that this is not the quickest mode of removing the limb; but securing the artery in the first instance prevents a patient, who is much reduced, from eventually sinking in consequence of the loss of a very considerable quantity of blood.

Vessels.

When the limb has been removed, branches of the obturator, ischiatic, and gluteal arteries will require to be secured. The sides of the wound are to be brought together, and, if they easily meet, by adhesive plaster only; but if there be any difficulty in their coalescence, it is best to employ a suture.

The same after-treatment is necessary as after other amputations.

Preferable to saw through the trochanter.

I am, however, of opinion, that in every case in which the amputation can be performed by sawing through the thigh-bone below the attachment of the capsular ligament, that it should be done in preference to opening the joint and removing the head of the bone from its socket.

Case.

I have only once amputated at the hip-joint, and the patient recovered, but only after excessive suppuration from the acetabulum, sloughing of portions of the cartilage, and continuance of suffering and fever, exposing him to great risk, which would have been greatly lessened, had it been possible from the state of the bone to have sawn through the os femoris at the trochanter.

Removal of the dressings.

The removal of the dressing for the first time after an amputation must depend in a great measure upon the feelings of the patient as regards the stump, and from the appearance of the discharge.

On the sixth or seventh day.

If the patient does not experience any unusual pain in the stump, the plasters should not be disturbed for six or seven days,

by which time the adhesion of the edges of the wound will have become sufficiently firm to prevent any risk from the removing the dressings, provided it be done carefully.

Part cut away.

Should the patient experience shooting pain in the stump, and have other symptoms of suppurative inflammation, some portion of the plaster should be cut away from the lower part of the wound, in order to allow of the escape of any matter that may form, and a light poultice should be applied.

Plasters snipped.

When a tightness is felt at any part of the stump from the pressure of the plaster, the surgeon should snip some of the straps on the side, which will generally relieve the pressure.

Mode of removing the plaster.

When the stump is dressed, the straps of plaster should be taken off one by one, and care is required not to disturb the ligatures; if union of the wound be not complete, some fresh straps should be applied as the old ones are removed, by which mode separation of the edges of the wound may be greatly prevented.

Sometimes to be removed early.

Should the first dressings become much loosened, or the stump be excessively painful, the plasters must be removed earlier than I have mentioned.

Separation of ligatures.

If the ligatures do not come away by the fourteenth day after the operation, the surgeon should gently draw each thread when he dresses the wound, in order to expedite their separation.

END OF THE FIRST VOLUME.

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